IMPERIAL MYCOLOGICAL INSTITUTE

REVIEW
OF
APPLIED MYCOLOGY

VOL. XXI DECEMBER 1942

THOMPSON (R. C.) & DOOLITTLE (S. P.). **Influence of temperature on the expression of big-vein symptoms in Lettuce.**—*Phytopathology*, xxxii, 6, pp. 542–544, 1 fig., 1942.

Big vein of lettuce, originally reported from the Imperial Valley of California [*R.A.M.*, xiv, p. 283], was observed during the last five years in New Jersey, Maryland, and North and South Carolina. In the greenhouse at Beltsville, Maryland, the typical symptoms of the disease, including enlargement and bleaching of the vascular regions of the petioles and leaf blades, veinbanding, and savoying, developed in plants maintained first at day and night temperatures of 65° to 75° and 50° to 60° F., respectively, then (at the stage of seed-stem elongation) for three weeks at 50° to 60° and 45° to 50°, respectively, and ultimately (until maturity) at the original day and night temperatures. The big-vein symptoms first became noticeable during the period of lowered temperatures and were completely obscured in the subsequent growth made after the restoration of warmer conditions, though persisting in the leaves formed while the drop in temperature was in operation.

SNYDER (W. C.) & RICH (S.). **Mosaic of Celery caused by the virus of Alfalfa mosaic.**—*Phytopathology*, xxxii, 6, pp. 537–539, 1 fig., 1942.

Golden Self Blanching celery was successfully inoculated with the aid of a carborundum abrasive at Berkeley, California, with juice from broad bean, *Petunia hybrida*, white clover (*Trifolium repens*), and *Melilotus indica* artificially infected by the lucerne mosaic virus from four localities in the State, the incidence of transmission [*R.A.M.*, xix, p. 358] being usually low but amounting in a few trials to 50 per cent. or more. The thermal inactivation point of the virus was found to lie between 60° and 65° C., its dilution end point to range from 1 in 2,000 to 1 in 3,000, and its longevity *in vitro* to persist for three to five days; it is transmissible by means of the pea aphid (*Illinoia* [*Macrosiphum*] *pisi*) [ibid., xx, p. 472]. The recovery of the virus from celery was effected by the mechanical inoculation of such hosts as lucerne, broad bean, cowpea, *Vigna sesquipedalis*, soy-bean, petunia, sweet pea, and white clover. The symptoms induced by the virus on celery consist of a faint to prominent, yellow-green mosaic, mostly of the outer leaves, in severe cases presenting a conspicuous calico-like pattern of lemon-yellow patches on a green background. Other features of the disorder may include mild blistering, a tendency to foliar distortion, vein-clearing, and the formation of yellow or cleared rings or round areas of green tissue. A mosaic of this type is frequently present on celery growing in proximity to diseased lucerne, suggesting a direct connexion between the mosaic of the latter and the signs of infection on the former.

NIETHAMMER (ANNELIESE). **Beiträge über die Kulturfähigkeit des Champignons Psalliota campestris.** [Studies on the cultivation of the Mushroom *Psalliota campestris*.]—*Zbl. Bakt.*, Abt. 2, cv, 7–9, pp. 129–130, 1942.

The following media have given good results in the culture of the edible mushroom,

Psalliota campestris, at a temperature of 23° to 25° C., at the German Technical College, Prague, Czechoslovakia: 1·5 per cent. beer wort agar; soil decoction (½ kg. soil left to stand in 1½ l. water for 24 hours, then steamed for one hour, filtered, and 1 per cent. ammonium sulphate added); wood pulp moistened with a synthetic solution of Stapp and Bortels (*Zbl. Bakt.*, Abt. 2, xc, p. 48, 1934), consisting of 0·5 gm. ammonium sulphate, 0·25 gm. potassium phosphate, and 0·1 gm. magnesium sulphate, made up to 1,000 c.c. with tap water; and oat glumes moistened with the same solution and enriched with 1 per cent. horse liver or faecal extract.

GRATZ (L. O.). **The perfect stage of Phomopsis vexans.**—*Phytopathology*, xxxii, 6, pp. 540–542, 2 figs., 1942.

In the course of cultural studies on *Phomopsis vexans*, the agent of a serious disease of eggplant, at the Florida Agricultural Experiment Station in 1939 and 1941, the writer observed on 2 per cent. potato dextrose agar the development of perithecia, 130 to 350 μ in diameter, occurring in clusters embedded in the carbonaceous stromatic tissue, furnished with beak-like, carbonaceous, sinuate ostioles, 80 to 500 μ in length, and occupied by clavate, sessile, hyaline, thin-walled asci, 28 to 44 by 5 to 12 (average 36 by 8·9) μ, containing eight biseriate, hyaline, narrowly ellipsoid to bluntly fusoid, bicellular spores, 9 to 12 by 3 to 4·4 (10·8 by 3·7) μ. Inoculations on eggplant seedlings with perithecial or ascospore suspensions gave rise to the typical lesions of 'tip over' (the local name for the blight in Marion County) bearing pycnidia, though the spots were not as abundant as those resulting from infection with pycnospores. The perithecial stage of the fungus, which is named *Diaporthe vexans* (Sacc. & Syd.) n. comb., has not yet been observed in nature.

SNYDER (W. C.). **A seed-borne mosaic of Asparagus Bean, Vigna sesquipedalis.**—*Phytopathology*, xxxii, 6, pp. 518–523, 2 figs., 1942.

In 1938 a small proportion (3·3 per cent.) of a commercial lot of Yardlong asparagus beans (*Vigna sesquipedalis*) at the University of California, Berkeley, developed a pale and dark green foliar mosaic frequently accompanied by downward rolling of the leaflets, mild rugosity or distortion, veinbanding, and stunting. Often the dark green areas formed broad bands along the chief veins, the remainder of the leaf being lighter green. The virus was transmitted from diseased to healthy plants both by the mechanical inoculation of expressed juice and through the agency of the pea aphid, *Macrosiphum pisi*. Attempts to infect other legumes were mostly unsuccessful, but cowpeas responded to inoculation by the development of symptoms resembling those of cowpea mosaic [*R.A.M.*, xxi, p. 444] while the features of the disease on beans (*Phaseolus vulgaris*) were unlike those of common mosaic (bean virus 1). The asparagus bean virus was found to be transmissible through the seed to the extent of 37 per cent., approximating in this respect to the mosaics of bean, cowpea, and soy-bean (virus 1) [ibid., xv, p. 418]. The thermal inactivation point of the asparagus bean virus was found to lie between 55° and 60° C., its longevity *in vitro* to persist for about two days, and its dilution end point to be situated nearer 1 in 1,000 than 1 in 3,000.

VASUDEVA (R. S.). **A mosaic disease of Cowpea.**—*Indian J. Agric. Sci.*, xii, 1, pp. 281–283, 2 pl., 2 figs., 1942.

Punjab type 1 cowpeas, inter-cropped with 'desi' cotton [*Gossypium indicum*] (Mollisoni 39 variety) in root-rot [*Macrophomina phaseoli* and *Corticium solani*] study plots at Lyallpur [*R.A.M.*, xxi, p. 450], developed symptoms of mosaic [ibid., iv, p. 203; xx, p. 444], of which three forms were differentiated, characterized primarily by (1) generalized stunting, more especially of the upper parts of the plant, thick, wrinkled foliage, vein-clearing, mottling, the dark green areas alternating with the yellow patches being sometimes raised like blisters, and marginal undulations;

(2) uniform foliar chlorosis without thickening or distortion; and (3) very conspicuous mottling, with pale to vivid yellow areas, later turning brownish, dark reddish discoloration of the veins, including the midrib, and dark brown or reddish spots, 1 to 2 mm. wide, on the upper leaf surface. Some 15 per cent. of the plants were affected in the mixed plots (the cotton being quite healthy), and the disease was further observed in a pure stand of Punjab type 3 cowpeas at the students' farm.

Transverse sections through diseased leaves showing typical form (1) symptoms revealed fusion of the cuticle and epidermal layer at various places along the wavy margins, paucity of palisade cells, which contain few chloroplasts, and discontinuity and irregularity of the tissues, abnormality of the spongy parenchyma, thickening and enlargement of the sclerenchyma cells and xylem vessels, and dispersion and disarrangement of the vascular bundles; the spongy and palisade tissues appeared to have been partially replaced by a number of elongated and irregular cells.

The juice from leaves of plants showing all the three above-mentioned types of mosaic was introduced separately by smearing on to the pricked foliage of healthy plants, all of which developed yellow mottling without distortion within five days.

COOK (H. T.) & HARTER (L. L.). **Wettable spergon not effective as a surface disinfectant of Sweet Potatoes used for seed.**—*Plant Dis. Reptr*, xxvi, 9, p. 222, 1942. [Mimeographed.]

Experimental data are given showing that wettable spergon [*R.A.M.*, xxi, p. 360] is unsuitable for treating sweet potato 'seed' for the control of black rot (*Ceratostomella fimbriata*).

DAINES (R. H.). **Spergon (chloranil) and scurf control of Sweet Potatoes.**—*Plant Dis. Reptr*, xxvi, 7, pp. 160–161, 1942. [Mimeographed.]

Experimental data are given showing that treatment of sprouts from sweet potatoes severely affected by scurf (*Monilochaetes infuscans*) with wettable spergon [see preceding and next abstracts] (1 lb. to 5 qts. water) was less effective than with semesan bel (1 in 10).

DAVY (R. H.). **Further evidence of the fungicidal value of spergon.**—*Plant Dis. Reptr*, xxvi, 7, pp. 162–163, 1942. [Mimeographed.]

In greenhouse trials carried out in Oklahoma in 1941 and 1942 treatment of the seed of Virginia soy-beans and hairy vetch (*Vicia villosa*) with new improved ceresan (½ oz. per bush.) and spergon (tetrachloroquinone) [see preceding abstract] (2 oz. per bush.) effectively prevented seed rots and pre-emergence damping-off in soil naturally infested with *Rhizoctonia* [*Corticium*] *solani*, the means of emergence counts being 99 and 117·5 for soy-beans against 59 for the controls and the corresponding figures for vetch 160, 170, and 145, respectively. The differences between ceresan and spergon were not statistically significant.

PEYER (E.). **Die Erfahrungen mit schwach konzentrierter Bordeauxbrühe bei der Mehltaubekämpfung in den Reben der deutschen Schweiz im Sommer 1941.** [Experiences with dilute Bordeaux mixture for the control of Vine mildew in German Switzerland during the summer of 1941.]—*Schweiz. Z. Obst- u. Weinb.*, li, 8, pp. 173–178, 1942.

Over the whole of German Switzerland the effective control of vine downy mildew (*Peronospora*) [*Plasmopara viticola*] with dilute Bordeaux mixture (in connexion with the copper consumption economy campaign) [*R.A.M.*, xxi, p. 497] proved perfectly feasible in the summer of 1941, which was not, however, apart from the second half of June, a season conducive to intensive outbreaks of the disease. The correct timing of the treatments was more important than the concentrations of the Bordeaux mixture used and the following schedule was successfully adopted: one or two

pre-blossom sprays with 1 per cent. Bordeaux plus 1 per cent. lime-sulphur and two post-blossom with 1 to 1·5 per cent. Bordeaux plus 0·5 per cent. lime-sulphur, and supplementary treatments, where necessary, consisting of 1 to 1·5 per cent. Bordeaux only. The average consumption for four applications was 17·1 l. per are [100 sq. m.] or 67 l. per 100 vines.

Fifty-fourth Annual Report of the Kentucky Agricultural Experiment Station for the year 1941.—55 pp., [1942].

In this report on plant disease work in Kentucky in 1941 [*R.A.M.*, xx, p. 561] it is stated that the White Burley tobacco variety Ky 16 has now been certified by the Kentucky Seed Improvement Association for four years, and that the certified seed is on sale. Over 60 per cent. of the Burley tobacco crop in Kentucky and the neighbouring states is Ky 16, which outyields the other commonly grown varieties in fields infected with black root rot [*Thielaviopsis basicola*: loc. cit.] and on clean land has given 10 to 30 per cent. heavier yields per acre than the stand-up Burley varieties generally grown.

Growers in areas where *Fusarium* wilt [*F. oxysporum* var. *nicotianae*: ibid., xix, p. 678] is causing injury are growing the resistant White Burley variety Ky 33. It is fast-growing and early-maturing, and gives a tobacco of satisfactory quality, but it is not recommended for areas where this particular disease is not found.

A strain of Burley tobacco (Ky 48–7) homozygous for the N factor, obtained from *Nicotiana glutinosa*, has proved to be virtually immune from tobacco mosaic [ibid., xxi, p. 227]. The plant resembles Ky 16 in appearance, but is smaller, and yields less; in comparative tests, Ky 48–7 yielded only 77 per cent. as much per acre as Ky 16. Because of the heavy losses from mosaic in dark tobacco, attempts are being made to produce mosaic-resistant strains of several of the dark tobacco varieties grown in western Kentucky by introducing the N factor. In the heterozygous condition (for N) the hybrid strains appear to be almost identical with the original dark varieties. Progress is also being achieved in the development of mosaic-resistant dark varieties of the Ambalema type, which are also resistant to *T. basicola*.

An outbreak of a disease of Burley tobacco near Lexington was ascertained to be due to a virus common in *Plantago major* [ibid., xxi, p. 227] and first reported by the Station in 1930 [ibid., xi, p. 7]. About 2 per cent. of the plants were much stunted and rather necrotic; they somewhat resembled plants affected with streak. On the Keeley and Pepper tobacco varieties the virus causes local necrotic lesions, sometimes followed by systemic necrosis and chlorosis, while on Turkish and Ky 16 Burley tobacco it induces a systemic mottle mosaic with a pattern differing somewhat from that of ordinary tobacco mosaic.

A virus disease of lucerne characterized by irregular, yellow, occasionally nearly white areas on a few leaflets per plant was transmitted mechanically to tobacco. Chlorotic, sometimes necrotic, ring-and-line patterns developed on rubbed tobacco leaves, followed by yellow to almost white ring patterns in new leaves, which were generally small and distorted. The condition was also transmitted mechanically to pepper [*Capsicum* sp.], tomato, and cucumber, but mechanical transmission to pokeweed [*Phytolacca decandra*] and garden bean [*Phaseolus vulgaris*] gave only necrotic spots. The virus appears to be a strain of *Marmor medicaginis* H. [lucerne mosaic virus].

The tobacco streak virus was transferred from tobacco to sweet clover [*Melilotus* sp.] through dodder [*Cuscuta campestris*: cf. ibid., xx, p. 590]; in the sweet clover it caused a ring spot-like mottling resembling a common field disease of sweet clover. The virus was re-transferred from sweet clover to tobacco by dodder in one trial.

A leaf spot apparently due to phosphorus deficiency was noted on Burley tobacco. The affected plants were small, and the leaves, especially at the basal halves, had a chlorotic cast; numerous necrotic, circular spots were observed on many of the leaves.

The phosphorus content of the leaves and soil was low. Later, affected plants became rare, the roots presumably occupying relatively larger soil volumes.

Conclusive evidence was obtained that *Bacterium angulatum* [*Pseudomonas angulata*: ibid., xxi, p. 431] can overwinter in soil in the field. Between 2nd November, 1940, and 18th April, 1941, *P. angulata* was recovered from 37 out of 180 soil samples collected from fields where naturally infected tobacco had grown in 1940. From 542 soil samples collected from bluegrass [*Poa pratensis*] and clover fields *P. angulata* was isolated from 13 samples, each sample coming from a field adjacent to a tobacco field. The organism was isolated by pouring a water suspension of soil over the under-surface of a water-soaked leaf, the bacteria being obtained from the leaf spot. Other evidence suggested that the bacteria can be washed from infected leaves into the soil by rain, and that as few as three or four individuals suffice to cause leaf spotting.

Barducci (T. B.). **Memoria anual de 1940 del Jefe del Departamento de investigaciónes de Algodón y cereales, Estación Experimental Agrícola de La Molina, Lima, Peru.** [Annual Report for 1940 of the Head of the Cotton and Agricultural Experimental Station of La Molina, Lima, Peru.]—30 pp., 71 graphs, [?1941. Received October, 1942. English summary.]

The following items of phytopathological interest occur in this report. During the season of 1939 to 1940 studies were conducted on 26 Tangüis cotton selections and the progenies of 378 plants phenotypically resistant to wilt (*Verticillium* sp.) [*R.A.M.*, xix, p. 212] from which 13 of the former and 61 of the latter, besides 202 phenotypically immune individuals, were reserved for further trials in connexion with the work of breeding for immunity from the disease. The average percentages of wilt in the selections and control variety (Hualcará, current season) at 93, 121, 155, 188, and 212 days were 6·81, 16·28, 21·01, 22·11 and 87·21, and 10·81, 29·40, 40·93, 44·29 and 92·29 respectively. In 1933–4 and 1937–8 the maximum incidence of wilt developed during a period extending from 100 to 140 days after sowing, when the optimum soil temperature (22° C.) for the growth of the pathogen at a depth of 5 cm. to 1 m. prevails. In 1938–9 and 1939–40 the selected strains were not attacked during the critical period, indicating an increase in genotypic resistance.

Progress is also reported in breeding wheat varieties resistant to black rust (*Puccinia graminis*), a limiting factor in the cultivation of the crop [ibid., xxi, p. 184].

Starr (M. P.) & Burkholder (W. H.). **Lipolytic activity of phytopathogenic bacteria determined by means of spirit blue agar and its taxonomic significance.**—*Phytopathology*, xxxii, 7, pp. 598–604, 1942.

The writers describe and tabulate the results of their studies on the lipolytic properties of 65 phytopathogenic species and varieties of the genus *Phytomonas* Bergey *et al.* [*R.A.M.*, xxi, p. 364], 206 isolates of which were cultured on plates of spirit blue-cottonseed oil-tryptone yeast extract agar (*Science*, N.S., xciii, pp. 333–334, 1941). Of 24 members of the *Xanthomonas* [ibid., xviii, p. 659] group, 21 were found to be actively lipolytic, viz., *X. barbareae*, *X. begoniae*, *X. campestris* and its var. *armoraciae*, *X. corylina*, *X. geranii*, *X. gummisudans*, *X. holcicola*, *X. juglandis*, *X. papavericola*, *X. pelargonii*, *X. phaseoli* (some strains of which were over 15 years old) and its variants *fuscans* and *sojense*, *X. pruni*, *X. translucens* and its var. *undulosa*, *X. vasculorum*, *X. vesicatoria* and its var. *raphani*, and *X.* sp. from stock (*Matthiola incana*) [ibid., xviii, p. 257]. Lipolysis was effected, on the other hand, by only four of the 27 species of *Pseudomonas* tested, namely, *P. alliicola*, *P. caryophylli*, *P. marginata*, and *P. polycolor*, and by none of the 18 gall-forming organisms and related Rhizobiaceae. Slight or doubtful lipolytic activity was exerted by *Corynebacterium fascians*, but the other three species of this Gram-positive genus failed to decompose the lipoids in the medium, the same applying to the three representatives of the

Gram-negative *Phytomonas* [*X.*] *stewarti* group [cf. ibid., xxi, p. 282], except for weak capacity for lipolysis on the part of *P. manihotis* [ibid., xxi, p. 325]. The well-marked differences between the various groups in respect of their fat-splitting attributes should prove helpful in the relegation of individual species to their several genera.

GILL (L. S.). **Death in the desert.**—*Nat. Hist., N.Y.*, l, 1, pp. 23–26, 9 figs., 1942.

A semi-popular account is given of the researches now in progress, under the joint auspices of the University of Arizona (J. G. Brown), the Bureau of Plant Industry, and the United States Department of Agriculture, on the virulent stem rot [*Erwinia carnegieana*] of the giant cactus or saguaro (*Carnegiea gigantea*) in the Tucson and Phoenix districts [*R.A.M.*, xxi, p. 365], where mortality is heaviest in the 150– to 200-year-old age class. Since the trees contain over 90 per cent. water by weight, they are extremely resistant to heat and diseased material cannot be disposed of by burning; burial pits have therefore been dug for the accommodation of the dead trunks, which have to be sawn into short lengths (one of 5 ft. weighing 1,500 lb.) and transported by a portable crane. After fumigation the butt sections are treated with a volatile disinfectant and covered with tarpaulin for several days before the pits are closed with soil. Promising results have been given by excision of the infected tissues at an early stage.

MARCHIONATTO (J. B.). **Las enfermedades de las plantas cultivadas de la Argentina y sus problemas.** [The diseases of cultivated plants in the Argentine and the problems connected with them.]—*Chron. bot.*, vii, 4, pp. 163–164, 1942.

The author reviews the existing literature on diseases of economic plants in the Argentine and sums up the present plant disease situation as follows. Most diseases of cereals occurring in the country are being controlled by the introduction of resistant varieties. Thus, hybrid 38 M.A., Sinvalocho M.A., and other wheats resistant to *Puccinia triticina* [*R.A.M.*, xx, p. 9] are now used in place of Lin Calel M.A. There are no resistant varieties in the case of *P. graminis tritici* [ibid., xxi, p. 247], but some hardy ones, which escape infection in the humid region, where this disease is predominant. *P. glumarum* [ibid., xx, p. 9], which appeared relatively recently (1929), but in a very virulent form, necessitated the elimination of the susceptible variety Record, and its replacement by resistant varieties (Klein Acero and others) while additional varieties are being developed in collaboration with workers in both Americas. Wheat bunt, *Tilletia tritici* [*T. caries*] and *T. laevis* [*T. foetida*: ibid., xxi, p. 246], predominant in the semi-arid regions (south of Córdoba and Santa Fe), has been controlled by the dry method of seed-grain disinfection. In the control of *Ustilago tritici* on wheat, the generally recommended seed-grain disinfection can in practice be applied only on large farms provided with the necessary installations, and the use of resistant varieties, such as 38 M.A., is therefore recommended. It is suggested that studies on the antagonism between micro-organisms may reveal methods of controlling *Ophiobolus graminis* [loc. cit.] and *Helminthosporium sativum* on wheat, since crop rotation, as recommended at present, can only reduce, but not eliminate, these parasites. Most of the varieties of maize cultivated in the country are stated to be resistant to *U. zeae*, which is the most common disease of this crop. *U. hordei* [loc. cit.] and *U. nuda* attack barley with some frequency; the same methods of control are effective against them as against wheat bunt and loose smut. The development of resistant varieties is further important for the control of *H.* [*Pyrenophora*] *teres* on barley (the most common disease on this host and sometimes very destructive when occurring together with *H. sativum* and *H. gramineum* [loc. cit.]), *Puccinia coronata* on oats, *P. dispersa* [*P. secalina*] on rye, and *Piricularia oryzae* on rice. The last-named, though of recent appearance in

the country, has been very virulent in the northern rice-growing region (Salta and Tucumán).

CLAASEN (C. E.), VOGEL (O. A.), & GAINES (E. F.). **The inheritance of reaction of Turkey–Florence–1 × Oro–1 to race 8 of Tilletia levis.**—*J. Amer. Soc. Agron.*, xxxiv, 8, pp. 687–694, 1 graph, 1942.

The F_1, F_2, and F_3 generations of crosses consisting of the three possible combinations of Oro–1, (Turkey–Florence)–1, and selection 9 of Oro × Turkey–Florence and six F_4 families of (T–F)–1 and Oro–1, chosen at random, were tested for their reaction to wheat bunt (*Tilletia levis*) [*T. foetida*] (race L–8) [*R.A.M.*, xvii, p. 381] under identical environmental conditions at the Washington Agricultural Experiment Station in 1939. Oro–1 is highly susceptible to the physiologic race used in the tests, while (T–F)–1 and selection 9 are both resistant. A major and at least one minor factor carried by (T–F)–1 appeared to account for the segregation of reaction of the cross between this variety and Oro–1. In the case of crosses between selection 9 and Oro–1 and (T–F)–1, the first-named carried only the major factor for resistance. The three parents represent three of the four homozygous genotypes possible under the two-factor hypothesis, the fourth being apparently typified by two F_4 families. Segregation of the major factor in combination with the minor homozygous resistant factor seems to have been attained in an F_4 family.

KARGOPOLOVA (Mme N. N.). Внутрисортовые скрещивания и повышение устойчивости яровых Пшениц к твердой головне. [Intravarietal crosses and the increased resistance of summer Wheats to bunt.]—*Яровизация* [*Vernalization*], iii (36), pp. 67–69, 3 graphs, 1941.

The results of experiments conducted near Leningrad during 1939 and 1940 showed that resistance to bunt [*Tilletia caries*: *R.A.M.*, xxi, p. 190] was greater in the F_2 progenies from crosses within a variety of wheat than in the progenies from selfed plants of the same variety. For example, 19·1 per cent. of the F_2 progenies from crosses within the variety Toulun ZA/32, were very resistant (0·1 to 5 per cent. infection), over 60 per cent. showed 0·1 to 15 per cent., and none over 40 per cent. while the corresponding figures for the selfed group were 1·8, 24, and 20 per cent., this last figure including plants showing up to 65 per cent. infection. In tests with the same variety during the following season, 52 per cent. of the F_2 progenies from crosses within the variety showed 0·1 to 40 per cent. infection, and 7·2 per cent. exhibited 60 to 64 per cent. infection, whereas 12 per cent. of the progenies from selfed plants showed 0·1 to 40 per cent. infection, and 42 per cent. exhibited 60 to 70 per cent. infection.

HELY (F. W.) & LUDBROOK (W. V.). **The effects of sodium chloride and of two manganese salts on the growth of Wheat and its susceptibility to Ophiobolus graminis Sacc.**—*J. Coun. sci. industr. Res. Aust.*, xv, 2, pp. 124–128, 1 pl. (between pp. 184 and 185), 1942.

In a field experiment the growth of wheat (total dry weight of aerial parts shortly before maturity) was increased by soil treatment, before sowing, with potassium permanganate and decreased by sodium chloride. The difference between these treatments was significant, but the difference between them and the control was not. An application of manganous sulphate had no significant effect. When each of these treatments was applied to wheat inoculated with *Ophiobolus graminis*, the fungus significantly depressed growth, but no evidence was obtained of any interaction between the fungus and the salts.

In two experiments in containers, in two successive years, the pathogenicity of *O. graminis* to wheat was reduced by the addition to the soil of sodium chloride at a concentration injurious to the wheat.

LUDBROOK (W. V.). **Root amputation experiments with Wheat under dry conditions, in relation to attack by Ophiobolus graminis.**—*J. Coun. sci. industr. Res. Aust.*, xv, 2, pp. 129–134, 1942.

At four stages of growth the root systems of Bencubbin wheat plants growing in the field near Canberra were injured experimentally by severing the subcrown internodes or by amputating the crown roots. The symptoms produced in the aerial parts by the former operation, and (though to a much smaller extent) by the latter, were indistinguishable from those seen on other plants in the same crop in which the subcrown internodes or seminal roots were rotted by natural infection with *Ophiobolus graminis*. The surface soil was very dry during the greater part of the growing period, and severing the subcrown internodes caused more damage at all stages of growth than amputation of the crown roots. It would, therefore, appear that when the surface soil is dry, the chief source of injury by *O. graminis* to wheat surviving the seedling stage may be want of the moisture which would be taken from the subsoil by the seminal root system, if not injured or destroyed by the fungus.

WHITE (N. H.). **The genetics of Ophiobolus graminis Sacc. 1. Heritable variations for culture colour and pathogenicity.**—*J. Coun. sci. industr. Res. Aust.*, xv, 2, pp. 118–124, 3 pl. (between pp. 184 and 185), 1 fig., 1942.

To determine whether discontinuous variations in culture colour on potato dextrose agar and in pathogenicity on wheat observed by the author among isolations of *Ophiobolus graminis* were heritable, a genetic study of the fungus was made with reference to the characters for pathogenicity on a single wheat variety and to culture colour on potato dextrose agar.

Eight single-spore isolates from a single ascus fell into two colour groups, four of the isolates being pale and four dark. In the dark cultures the mycelium consisted of hyaline microhyphae and dark olivaceous macrohyphae, while in the pale cultures it consisted entirely of hyaline microhyphae. Of the dark cultures two were homotypes for aerial hyphae, and two for flat colony surface; of the pale cultures, two were homotypes for white aerial hyphae, and two for flat colony surface.

Each isolate was pathogenic to wheat, and according to the degree of pathogenicity shown there were two groups of four isolates, one severely, the other mildly, pathogenic. The former was characterized by the many plants killed by seedling blight and by the severe stunting of the survivors, while the yield was negligible; the latter was characterized by the relatively numerous plants that survived seedling blight and reached maturity, and by less stunting. When the test was repeated a year later, identical results were obtained.

The evidence demonstrated the presence of four phenotypes, two isolates belonging to each. These were (i) dark and mildly pathogenic, (ii) dark and severely pathogenic, (iii) pale and mildly pathogenic, and (iv) pale and severely pathogenic. Hence, the ascus contained four pairs of spores differing in character for pathogenicity and culture colour.

As the thallus of *O. graminis* is haploid, the effect of a single set of genes may be observed without the complications of dominance. The characteristics of each of the eight isolates, which were derived from a diploid primary ascus nucleus by reduction division, are due to a single set of genes. As there were four isolates of each of two phenotypes for colour and for pathogenicity, segregation occurred during ascosporogenesis, and the primary ascus was heterozygous. The production of four pairs of spores in one ascus suggests that segregation for one pair of factors occurred in the first division, and for the other pair in the second division of sporogenesis. This is explicable on the assumption that crossing-over of one pair of factors occurred at the pachytene stage in the first nuclear division. This resulted in one pair of factors segregating reductionally at the first meiotic division and the other pair of factors segregating equationally at the second meiotic division of the primary ascus.

The suggestion that characters for pathogenicity in *O. graminis* and other pathogenic ascomycetous fungi are Mendelian is supported by the fact that segregation for pathogenicity occurs during ascosporogenesis in *Venturia inaequalis*.

GLYNNE (MARY D.). **Cercosporella herpotrichoides Fron, causing eyespot of Wheat in Great Britain.**—*Ann. appl. Biol.*, xxix, 3, pp. 254–264, 1 pl., 1942.

Surveys of wheat crops in England in 1941 showed that when there is a high percentage of straw infection by *Cercosporella herpotrichoides* [*R.A.M.*, xx, pp. 295, 396; xxi, p. 124] the probability of general lodging in heavy crops is greatly increased. Individual straw lodging occurs in both light and heavy crops, the straws falling in all directions. The condition may, it is estimated, cause a reduction in grain yield of 30 per cent. A survey of 170 fields selected at random in 16 counties revealed that eye spot increased in frequency and severity as the fields were situated progressively further east; thus, in North Wales and the eastern counties (Lincolnshire, Cambridgeshire, and Norfolk) 3·6 and 84·5 per cent. of the fields, respectively, were affected, the corresponding figures for the areas lodged being 1·1 and 16·4 per cent., and for the areas of the district under wheat in 1939 0·17 and 12·89 per cent., respectively.

In three independent surveys 235 fields included 118 in which no barley or wheat had been grown for four years, and 37 of these showed infection, under 20 per cent. of the straws being infected in each field; there were 115 fields in which wheat or barley had been grown at least once in the preceding four years, and of these 89 showed infection, over half of them with more than 20 per cent. straw infection. Infections of over 20 and over 70 per cent. occurred in a few fields in which the last wheat or barley crop had been grown in 1937 or 1938, but such figures were most common where wheat or barley (or one of each) had been grown during at least two of the preceding four years.

It is concluded that eye spot will probably become more prevalent in wheat-growing areas under war-time conditions. Lengthening the rotation would reduce infection. If wheat is to be grown on land where severe infection has occurred, suitable preventive methods should be applied, including reduction of atmospheric moisture round the base of the plant, especially in spring by means of good drainage, thin sowing, wide spacing of rows, use of sparsely tillering varieties, and the checking of excessive spring growth. Short-strawed varieties might well be tried. Records should be made of the effects of these measures.

[A popular account of this disease, incorporating the results of investigations here recorded, is given by the author in *J. Minist. Agric., Lond.*, xlix, 2, pp. 91–94, 4 figs., 1942.]

NOVER (J.). **Untersuchungen über den Weizenmehltau, Erysiphe graminis tritici, im Rahmen der Resistenzzüchtung.** [Studies on Wheat mildew, *Erysiphe graminis tritici*, in relation to breeding for resistance.]—*Z. PflZücht.*, xxiv, p. 71, 1941. [Abs. in *Züchter*, xiv, 5, p. 125, 1942.]

At the Agricultural and Plant Breeding Institute, Halle, the writer carried out greenhouse inoculation experiments with two physiologic races of *Erysiphe graminis tritici* on over 800 varieties and selections of winter and summer wheat [*R.A.M.*, xix, p. 206]. Nearly all the winter types proved to be susceptible, with the exception of some individual plants from collections made by the German Hindu Kush expedition, but there was a higher incidence of resistance among the summer wheats, both indigenous and exotic. The results of tests on an assortment of 16 varieties with 'populations' of 50 German mildew collections revealed that in 22 'populations' a single physiologic race predominated. Field observations pointed to the gradual acquisition with advancing maturity of resistance to certain races of the pathogen in some varieties irrespective of the reactions displayed in the seedling stage, while a form of field resistance evidently conditioned by environmental factors was also

noticed. In hybridization trials resistance proved to be dominant: of six crosses, two (with the resistant Dixon C.I. 6295) segregated on a definitely monomerous basis in the F_2, while the other four (with Illinois No. 1 selection 47 and Normandie) segregated in the ratio of 4 to 6·5 resistant : 1 susceptible.

Bever (W. M.). **A nonpathogenic buff-coloured Barley smut.**—*Phytopathology*, xxxii, 7, pp. 637–639, 1 fig., 1942.

In September, 1936, in connexion with a study at the Idaho Agricultural Experiment Station of the genetics of hybrids between a physiologic race of *Ustilago hordei* and two of *U. nigra*, F_1 chlamydospores were obtained on Odessa barley (C.I. 934) from infection with paired monosporidial lines of the two smuts, and used, together with those of subsequent generations, for the reinoculation of seed of the Nepal (C.I. 595), Lion (C.I. 923), and Himalaya (C.I. 1312) varieties. One plant of the first-named bore two identical buff-smutted heads containing F_3 chlamydospores, which were hyaline, glabrous, and intermediate in size between *U. hordei* and *U. nigra*, the sporidia being long, narrow, rather pointed, and smaller than those of either of the parent smuts, though approximating more closely to the latter. Spore germination was irregular, two or three firmly adhering sporidia on a promycelium, instead of the normal four, being of fairly common occurrence. Sporidial fusion in culture disclosed the existence of two sex groups [*R.A.M.*, xiv, p. 353], but no infection was produced on the Nepal or Odessa variety by inoculation with chlamydospores or paired monosporidial lines, suggesting that sex and pathogenicity are governed by different factors.

Science for the farmer.—*Rep. Pa agric. Exp. Sta. 1940–41* (*Bull.* 414), 63 pp., 19 figs., 3 graphs, 1941.

On p. 13 of this report [cf. *R.A.M.*, xx, p. 104] it is stated that as a result of steadily increasing popularity following trial distribution, the 90A–27 oat strain, which is resistant to smut [*Ustilago avenae* and *U. kolleri*: ibid., xxi, pp. 329, 367], has been released for certification. Some 3,000 acres of this strain were grown in Pennsylvania in 1940, and no severe criticism was received. It is high-yielding under the conditions prevailing in the central parts of the State, and very resistant to smut.

Hageman (R. H.), McHargue (J. S.), Sherman (G. D.), & Hodge (E. S.). **The production of grey speck of Oats in purified sand cultures.**—*J. Amer. Soc. Agron.*, xxxiv, 8, pp. 731–735, 1 fig., 1942.

At the Kentucky Agricultural Experiment Station typical grey speck developed in the very susceptible Wolverine variety [*R.A.M.*, xxi, p. 193] growing in a sand culture devoid of manganese, but there was a sufficiency of this element in the chemicals composing the unpurified 'three-salt solution' (*Plant Physiol.*, xv, pp. 727–733, 1940) to prevent the development of the disease in an acute form, while culture solutions containing 2 p.p.m. manganese supported normal growth.

Kernkamp (M. F.) **The relative effect of environmental and genetic factors on growth types of Ustilago zeae.**—*Phytopathology*, xxxii, 7, pp. 554–567, 1942.

Further studies at the Minnesota Agricultural Experiment Station on the relative effects of environmental and genetic factors on the three growth types of maize smut (*Ustilago zeae*) [*R.A.M.*, xviii, p. 670] confirmed previous conclusions, namely, that the specifically sporidial and mycelial lines are unalterably fixed, whereas those of intermediate tendency may be shifted in one direction or the other by various external stimuli, of which dextrose (100 gm. per l.) was the most effective in the production of sporidia, while mycelial development was favoured by conditions repressive to the growth of the organism, e.g., the addition to the medium of poisons (mercuric chloride, copper sulphate, lead acetate, and iron chloride) or toxic dyes (including

malachite green), low concentrations of essential nutrients, and a reduction in the amount of oxygen in the atmosphere. Grown on extracts of 'natural' substrata, i.e., soil, silage, manure, and maize, the intermediate lines also tended to assume a predominantly mycelial character, probably reflecting the normal course pursued by the smut in the field.

MOULTON (J. E.). **Extraction of auxin from Maize, from smut tumors of Maize, and from Ustilago zeae.**—*Bot. Gaz.*, ciii, 4, pp. 725–739, 1942.

In experiments in the extraction of auxin from smut (*Ustilago zeae*) tumours of maize, water extraction yielded more auxin than ether. Dry ether extracts were inactive. For the liberation of auxin from the tumour tissues water is necessary, its action, possibly, being hydrolytic. The maize tumours yielded auxin slowly with either water or ether extraction, whereas the auxin was almost entirely removed from mats of the fungus itself in one ether extraction. Tumours from maize leaves and stems gave more auxin than healthy leaves and stems. Strains of *U. zeae* grown on a synthetic medium devoid of protein and amino acids produced auxin. Extracts of organic and inorganic types of medium upon which the fungus had grown for two months contained much auxin, the amount being virtually the same for each type of medium. Solopathogenic strains of *U. zeae* [cf. *R.A.M.*, xix, p. 528], except in one case, produced more auxin than non-solopathogenic strains, and the pathogenicity of strains would appear to be correlated with ability to produce auxin in a lacto-tryptone or synthetic medium.

LINCOLN (R. E.) & GOWEN (J. W.). **Mutation of Phytomonas stewartii by X-ray irradiation.**—*Genetics*, xxvii, 4, pp. 441–462, 2 pl., 1942.

At the Iowa Agricultural Experiment Station the writers conducted a comparative study of the mutations occurring in two strains, rough and smooth, of *Phytomonas* [*Xanthomonas*] *stewarti* [*R.A.M.*, xix, p. 468], the agent of vascular wilt in maize, under natural conditions and as a response to the stimulus of X irradiation of low quantum energy, operating at an intensity such that 100,000,000 viable cells suspended in broth were reduced to 1,000 during a 25-minute treatment. Variations were observed in colony colour, surface appearance, and size, the spontaneous and X-ray-induced mutations differing only in the greater frequency of the latter. The modifications of colony characters under observation may be either more or less pathogenic to maize than the parent strains. Apart from mutations to an unstable form, the mutants developing in these experiments were apparently equally stable with the parent strains from which they proceeded. The terms 'mutant', 'variant', 'saltant', and 'dissociant', as applied to bacteria, are regarded as synonyms descriptive of the phenomena resulting from gene mutation, the physical basis of inheritance being similar in *X. stewarti* to that of higher organisms.

MELCHERS (L. E.). **On the cause of the Milo disease.**—*Phytopathology*, xxxii, 7, pp. 640–641, 1942.

Recent studies at the Kansas Agricultural Experiment Station, carried out with the aid of D. B. Creager and C. M. Slagg, have shown that the root, crown, and shoot rot of milo sorghum commonly ascribed to *Pythium arrhenomanes* [*R.A.M.*, xx, p. 298] is actually due to a more complex set of factors to be discussed in detail in another paper. The fungus is equally virulent on susceptible strains of milo and on those known to be resistant to the root rot, and moreover, neither seedlings nor older plants grown in sterile or non-sterile soil containing pure cultures of the organism contracted the typical symptoms of the disease. It is thus evident that other micro-organisms, environmental conditions, or contributory factors must be involved in the etiology of the milo rot.

COWART (F. F.). **The effect of magnesium deficiency in Grapefruit trees upon the composition of fruit.**—*Proc. Amer. Soc. hort. Sci.*, xl, pp. 161–164, 1942.

In field experiments with Duncan and March grapefruit trees exhibiting severe magnesium deficiency [*R.A.M.*, xx, p. 461], started in Florida in 1937, plots receiving a fertilizer containing no magnesium continued to show severe symptoms, those treated with fertilizer containing 2 per cent. magnesium oxide from magnesium sulphate showed only slight symptoms, while the addition of 4 per cent. magnesium oxide induced complete recovery. Analyses of fruits from all three plots showed that those from plots with no symptoms have the highest content of total soluble solids and sugars, vitamin C, and citric acid, while those from plots with the most severe symptoms have the lowest. The differences were slightly less pronounced during the early part of the season than at later dates. It is concluded from these data that a magnesium deficiency in grapefruit leads to a shortage of those components which are to a large extent responsible for the internal quality of the fruit. The improvement in internal quality of the fruit following the application of fertilizers containing magnesium is attributed to the great increase in leaf area and general efficiency of the foliage on these trees.

AVERNA-SACCÁ (R.). **Contribuïção para o estudo das doenças cryptogâmicas das plantas cítricas. Uma gommose produzida por Dothiorella.** [A contribution to the study of the fungal diseases of Citrus plants. A gummosis caused by *Dothiorella*.]—*Rev. Agric., Piracicaba*, xiii, 3–4, 22 pp., 13 figs. (2 col.), 1938. [Received October, 1942.]

This is a detailed study of the morphological and cultural characters of *Botryosphaeria* (*Dothiorella*) *ribis*, the agent of a serious die-back and gummosis of citrus in São Paulo, Brazil, where the more susceptible species include Galician and sweet (*Citrus lumia*) lemons [*R.A.M.*, xix, p. 659], citron, Persian and Navel limes (*C. bergamia* and *C. limetta*), and Coronel and Pear oranges (*C. corniculata* and *C. piriforme*) [ibid., xvii, p. 171], bitter and Satsuma oranges and tangerines being semi-immune.

LEPESME (P.). **Ennemis et maladies du Caféier en Afrique intertropicale. Diagnose pratique et moyens de lutte.** [Pests and diseases of Coffee in intertropical Africa. Practical diagnosis and control measures.]—63 pp., 39 figs., Paris, Larose, 1941. [Abs. in *Z. PflKrankh.*, lii, 6, p. 317, 1942.]

This treatise deals primarily with the diseases of the coffee crop in French Equatorial Africa and the Cameroons, the subject-matter being arranged under the various organs of the host. The diseases are in the main identical with those occurring in other parts of tropical Africa, but the approach to control problems is somewhat different in the west, where prophylactic treatments with Bordeaux mixture against *Hemileia vastatrix*, for instance, are recommended at the beginning and end of the rainy season. A separate section is devoted to indirect control by means of cultural measures, based on personal experience.

NEAL (D. C.) **Rhizoctonia infection of Cotton and symptoms accompanying the disease in plants beyond the seedling stage.**—*Phytopathology*, xxxii, 7, p. 641, 1942.

An uncommon phase of the cotton damping-off due to *Rhizoctonia* (*Corticium vagum*) [*C. solani*] was noted in the Louisiana Delta in 1940 and 1941. Many of the plants in the early flowering stage, 7 to 14 in. high, were almost devoid of lateral roots, semi-prostrate, and with few fruiting branches. The stems bore deep-seated cankers above and below the soil-line, and many showed characteristic constrictions almost severing the stems just beneath the surface. About 90 per cent. of the cultures from infected tissues yielded *C. solani*. In cold, wet spring weather, therefore, the

disease, which is ordinarily confined to early-planted cotton seedlings, may persist sufficiently late to cause appreciable damage to older plants.

DASTUR (J. F.). **Effect of Cotton seed disinfection on yield.**—*Indian J. agric. Sci.*, xii, 2, pp. 364–367, 1942.

In experiments conducted during the five-year period from 1936 to 1941 at Nagpur to determine the effect on yield of cotton seed disinfection against *Pythium* sp., *Rhizoctonia* [*Corticium*] *solani* [*R.A.M.*, xxi, p. 450], *R.* sp., *Sclerotium rolfsii*, and *Colletotrichum indicum* [ibid., xx, p. 149], the following percentage increases of production resulting from treatment were recorded: agrosan G from 1·7 to 38·3, hortosan B [ibid., xviii, p. 373] from 9·1 to 44·6, abavit B, from 5·9 to 40·3, ceresan from 16·3 to 25·9, copper carbonate from 8·2 to 38·9, sulphur from 12·4 to 33·7, and sulphuric acid for delinting from 8·7 to 10·4, the first three being used at the rate of 1 oz. per 28 lb., the next two at 2 oz., and the last at 20 parts by volume. Ceresan not being on the Indian market, and the delinting process impracticable for the ordinary cultivator, these two modes of treatment were discontinued after 1939. In further trials at various localities from 1939 to 1941, agrosan G induced increased yields ranging from 2 to 31·2 per cent., copper carbonate from 4·7 to 19·0, and sulphur from 1·9 to 32·5. In spite of certain inconsistencies in the results, the fungicidal treatment of cotton seed may be recommended as calculated to stimulate germination and ensure a reduction in the incidence of loss from disease.

PARKIN (E. A.). **Symbiosis and Siricid woodwasps.**—*Ann. appl. Biol.*, xxix, 3, pp. 268–274, 2 figs., 1942.

A study of the association between the woodwasps *Sirex gigas* and *S. cyaneus* and the fungi with which they live in symbiosis [*R.A.M.*, xix, p. 213] demonstrated that one species only, *Stereum sanguinolentum*, is present in the intersegmental sacs at the anterior end of the ovipositor of adult females. The egg becomes infected with oidia at the beginning of its passage down the ovipositor, and when it has been deposited in timber, mycelial growth begins. The fungus passes into the wood before the larva, which is probably mycetophagous, at least to some extent. The hypopleural organs, found in a proportion of the larvae, also contain the same fungus. No fungus was observed in pupae, and it is thought that *S. sanguinolentum* must grow from the walls of the pupal chamber into the intersegmental sacs of the immature female immediately after emergence from the pupal skin.

DESFORGES (A.). **Mycoses des pieds (pieds d'athlète): diagnostic et traitement.** [Mycoses of the feet (athlete's foot): diagnosis and treatment.]—*Un. méd. Can.*, lxxi, 9, pp. 940–941, 1942.

'Athlete's foot', without doubt the commonest skin disorder in the United States [*R.A.M.*, viii, p. 781 *et passim*], is stated to be equally prevalent in Canada, where it is attributable to *Epidermophyton inguinale* [*E. floccosum*].

KOERTH (C. J.), MCCORKLE (R. G.), & DONALDSON (J. M.). **Fungus diseases of the lung.**—*Tex. St. J. Med.*, xxxviii, 1, pp. 8–14, 12 figs., 1942.

Attention is drawn to the risks of insufficient evidence for the diagnosis of pulmonary tuberculosis, which is frequently simulated by such mycotic infections of the lung as bronchomoniliasis, actinomycosis, and aspergillosis. In the four cases reported from the Woodmen of the World Hospital, San Antonio, Texas, species of *Actinomyces*, *Aspergillus*, *Monilia* [*Candida*] *tropicalis*, and possibly *M. candida* [*C. vulgaris*] were cultured from the sputum.

NOTTEBOHM (T.) & NEGRONI (P.). **Queilitis por Candida suaveolens [(Lindner) Ciferri].** [Cheilitis due to *Candida suaveolens* (Lindner) Ciferri.]—*Rev. argent. Dermatosif.*, xxiv, 3, pp. 294–298, 1 fig., 1940. [French and English summaries.]

A fungus isolated on Sabouraud's media from the scales of labial cheilitis in a 21-year-old male patient was classified as *Candida suaveolens* (Lindner) Ciferri, although it differed from Langeron and Guerra's description [*R.A.M.*, xviii, p. 253] in its negative auxanograms for lactose, urea, and ammonium sulphate. The organism multiplies exclusively by budding, the cells being globular, oval, or elongated, and measuring on the 45th day in liquid beerwort 3·7 by 2·8 to 9·3 by 9·3 and 9·3 by 3·7 μ. The auxanograms for glucose, galactose, maltose, lactose, saccharose, raffinose, and peptone were positive.

MIDDLETON (J. T.), TUCKER (C. M.), & TOMPKINS (C. M.). **Pythium disease of fibrous-rooted Begonia and its control.** —*J. agric. Res.*, lxv, 2, pp. 89–95, 2 figs., 1942.

This is an expanded account of a disease of fibrous-rooted begonia, caused by *Pythium debaryanum*, *P. ultimum*, and *P. splendens* in California and Missouri, of which a short version has already been noticed [*R.A.M.*, xviii, p. 113]. In potted plants the disease was found to be favoured by excessive watering, particularly when the water was sprinkled, and by a temperature range of between 60° and 70° F. The minimum, optimum, and maximum temperatures for growth were found to be 4°, 28° to 31°, and 37°, respectively, for *P. debaryanum*; 10°, 28° to 31°, and 34° for *P. splendens*; and 4°, 25° to 28°, and 37° for *P. ultimum*. The last-named fungus proved to be pathogenic to spinach, sweet william, rocket larkspur (*Delphinium ajacis*), cauliflower, *Reseda odorata*, *Godetia grandiflora*, *Schizanthus pinnatus*, and cucumber, but not to the other 34 species of test plants, belonging to 32 genera in 19 families. Pure cultures of all three fungi caused approximately 90 per cent. damping-off in potted tomatoes when added to the sterile soil in which they were sown. It is suggested that the disease can be controlled in the greenhouse by steam sterilization of the flats and soil and by proper spacing and careful watering of the plants, while after transplantation out of doors, the degree of new infection can be materially lowered by keeping the plants relatively dry. One pink-flowering hybrid, for which the name Calmo is proposed, was found in repeated experiments to be immune from *P. ultimum* in the open as well as in the greenhouse.

LANSDON (R. F.). **The genus Cerebella Cesati—its biological status and use.** —*Phytopathology*, xxxii, 7, pp. 613–617, 1942.

Following a brief survey of the literature on the genus *Cerebella* Cesati 1851, the writer states that since May, 1940, collections of *C. inquinans* have been made on 13 species of grass in south-eastern Queensland, always in association with numerous *Claviceps* conidia [*R.A.M.*, xxi, p. 81]. *Cerebella inquinans* was isolated from the spikelets of each of the hosts and cultured on potato dextrose agar, on which the characteristic cerebriform stroma of the genus develops in a few days; potato slices or potato agar with sucrose, glucose, or honey were also suitable media for spore production by the fungus. The inoculation of *Paspalum dilatatum* and *P. orbiculare* with a spore suspension of *C. inquinans* alone gave negative results, but the former host responded to artificial infection with a mixture of conidia of *C. inquinans* and *Claviceps paspali* [ibid., xxi, p. 452] by the production of an exudate of honey-dew in a week, the typical stromata of *C. inquinans* appearing two to three days later on the ergotized spikelets. These results, taken in conjunction with those reported by previous workers, indicate that species of *Cerebella* occur merely as saprophytes on any substratum rich in carbohydrates, notably the honey-dew secretions associated with the *Sphacelia* stage of *Claviceps* spp.

Four points arise from these supplementary data on the relationship between *Cerebella* and its hosts, namely, (1) the substitution of *Sphacelia* for *Cerebella* in host

indexes and a search made for the species of *Claviceps* involved in each case. (2) *Cordiella* provides for the natural control of ergot by the inhibition of sclerotial development. (3) It serves as a reliable field indicator of the presence of ergot. (4) The history of ergot in a country may be traced through records of *Cordiella* on grasses. The need for a revision of the genus is stressed.

ALBRECHT (H.). **Effect of diseases upon survival of White Clover, Trifolium repens L., in Alabama.**—*J. Amer. Soc. Agron.*, xxxiv, 8, pp. 725–730, 3 figs., 1942.

In a study at the Alabama Agricultural Experiment Station and elsewhere in the State from 1940 to 1942 on the effect of diseases on the capacity of white clover (*Trifolium repens*) to survive the extreme heat of summer, southern blight (*Sclerotium rolfsii*) was found to be much the most destructive of the ten pathogens including the nematode, *Heterodera radicicola* [*H. marioni*]), so far investigated, attacking 481 of the 750 lines under observation in 1940, and 202 out of 277 in 1942. Ladino and other varieties of similar root and stem habit being particularly susceptible. Other fungi causing heavy damage to the leaves were *Stemphylium solani* [*R.A.M.*, xxi, p. 22] and a species of *Cercospora*, while the other organisms present included *Pythium* [*Dubiaidia* or *Cunninghamella*] *irregulare* [loc. cit.], *Botrytis* sp., *Sclerotinia trifoliorum*, *Bacillus* [*Erwinia*] *lathyri*, *Colletotrichum trifolii*, and *Fusarium* sp. In many cases the plants were attacked simultaneously by more than one pathogen: of the 750 examined in 1940, for instance, 190 were infected by two, 275 by three, 282 by four, and 39 by five. A number of clover strains (38 in the case of *Sclerotium rolfsii*) have given promise of resistance to the various diseases enumerated, most of which reached a climax of virulence after mid-June, when the main crop had attained maturity. The strands in over-grazed or sparsely vegetated pastures were much less subject to disease than those in sites of abundant growth.

BLASER (R. E.) & STOKES (W. E.). **The chemical composition, growth, and certain deficiency symptoms of Carpet Grass, Axonopus affinis, as affected by lime and fertilizer mixtures.** *J. Amer. Soc. Agron.*, xxxiv, 8, pp. 763–788, 2 figs., 1942.

The omission of phosphorus from the lime and fertilizer mixture applied to plots of carpet grass (*Axonopus affinis*) in the Coastal Plain of Florida led to the development of a dull green to purplish coloration of the plants. Burning of the blade tips was a feature of stands from which potassium was withheld.

CARLSON (J. W.). **Seed of new wilt-resistant winter hardy Alfalfa to be increased for general distribution.**—*Farm Home Sci., Utah*, n. 4, pp. 1, 11, 1 fig., 1941.

The Utah Agricultural Experiment Station has entered into a co-operative agreement with the Utah Crop Improvement Association for the production of certified seed of high quality of various important field crops. As part of this programme the Utah Station, the Division of Forage Crops and Diseases of the United States Department of Agriculture, and the Wisconsin Agricultural Experiment Station are co-operating in a special effort to produce foundation seed stocks of lucerne possessing confirmed resistance to bacterial wilt [*Corynebacterium insidiosum*; *R.A.M.*, xx, pp. 345, 535; xxi, p. 121], increased winter-hardiness, and other desirable qualities.

Small, well-isolated plots are established from a few ounces of seed obtained from highly improved plants grown under greenhouse conditions. The seed, treated with concentrated sulphuric acid, is planted in the greenhouse or cold frame, where the seedlings are maintained under optimum conditions until they are about six weeks old. The best isolation for small plots is in small towns, where little lucerne is grown; larger plots are isolated in dry regions where wheat is the major crop and much of the soil is still uncultivated. By these methods and careful insect control, the seed of the new strains has been increased from a few ounces in spring to as much as 50 lb. by the autumn. Trial plots are then set up with this seed in many States.

where the new strains are studied; those that pass these tests are recommended for trial in commercial plantings.

Peterson (M. L.) & Melchers (L. E.). **Studies on black stem of Alfalfa caused by Ascochyta imperfecta.**—*Phytopathology*, xxxii, 7, pp. 590–597, 2 figs., 1 graph, 1942.

A number of different fungi having been implicated in the etiology of black stem of lucerne, studies were carried out on the origin of the disease as it occurs in Kansas, where the causal organism was identified as *Ascochyta imperfecta* [*R.A.M.*, xxi, p. 336], the pycnospores of which on potato dextrose agar ranged from 6 to 15 by 2·5 to 4 μ, thus agreeing with the dimensions previously reported by Peck (*Bull. N.Y. St. Mus.* 157, 1912) and by Toovey *et al.* from England [*R.A.M.*, xvi, p. 258]. The pathogen, which probably overwinters in the form of dormant mycelium and pycnidia in the crop refuse, induces destructive defoliation and discoloration of the hay crop, especially under the cool, moist conditions prevailing at the time of the first cutting. In the field infection is disseminated by means of splashing raindrops, within which the spores are conveyed from the diseased tissues to the growing shoots. The optimum temperature for the growth of *A. imperfecta* in culture was 21° C., the minimum and maximum being 9° and 33°, respectively; pycnidial production took place from 9° to 30° and was most abundant at 27°. Spore suspensions from sterile sweet clover (*Melilotus*) stems were sprayed on to healthy Turkestan and Ladak lucerne leaves with positive results, the severity of the resultant lesions being independent of the age of the plants. *Medicago falcata* and *M. ruthenica* were added to the list of hosts of *A. imperfecta*.

Meier (K.). **Über Gelbsucht an Obstbäumen, Reben und Gartenpflanzen.** [On chlorosis of fruit trees, vines, and horticultural plants.]—*Schweiz. Z. Obst.- u. Weinb.*, li, 18, pp. 357–361, 1942.

The complex of adverse environmental factors inducing chlorosis of fruit trees, vines, and horticultural plants, many specimens of which are submitted to the Wädenswil Experiment Station for advice, are discussed under various headings, including soil deficiencies, especially of nitrogen and potash, unfavourable physical structure of the soil associated with waterlogging, defective aeration, and other factors, and unduly low winter and spring temperatures.

Burrell (A. B.) & Cain (J. C.). **A response of Apple trees to potash in the Champlain Valley of New York.**—*Proc. Amer. Soc. hort. Sci.*, xxxviii, pp. 1–7, 1941.

Burrell (A. B.), Cain (J. C.), & Brinkerhoff (L. A.). **Response of Apple trees to potash in the Champlain Valley. II. A third-year growth response and a first-year reduction in leaf scorch.**—ibid., xl, pp. 8–12, 1942.

For 14 years leaf scorch [*R.A.M.*, xx, p. 478] and an unthrifty condition of trees resembling potassium deficiency has been observed in certain apple orchards in the Champlain Valley, New York State. Yearly applications of potassium to McIntosh apple trees gave the following results. In the first experiment commenced in 1939 on nine-year-old trees growing in rather infertile soil, applications of either 3 lb. sulphate of potash or 1½ lb. each of sulphate and muriate of potash per tree in a foot-wide trench round the tree induced no response in the first year, a conspicuous reduction of leaf scorch in the second, and merely a trace of the disorder as compared with 64 per cent. on the controls in the third, when the average growth per terminal was 11 as compared with 4 in., the average total terminal growth per tree 1,477 as compared with 494 in., and the potassium content of the leaves 1·76 per cent. as compared with 0·70. In a second experiment commenced in 1938 with seven-year-old trees grown in rather less infertile soil, soil applications of either 5 or 2 lb. muriate of

potash or 3 lb. sulphate of potash in either holes or bands about 2 ft. from the tree induced no response until the third year, when leaf scorch was entirely controlled, the potassium content of treated leaves being increased by more than 200 per cent. over that of untreated. In a third experiment commenced in 1941, mostly with six-year-old trees grown in relatively fertile soil, applications of sulphate of potash at the rate of 3 lb., muriate of potash at that of 2 lb. 6 oz. per tree, or a 1 per cent. sulphate of potash spray caused a response to all treatments within two months. The spray treatment appeared to give more rapid control, but this superiority was not maintained throughout the summer. The reduction in leaf scorch 3½ months after treatment ranged from 33 to 49 as against 6 per cent. in the untreated trees; the potassium content of leaves was raised by soil applications to from four to six times that of the control, and by spraying to from two to three times. Although the spray treatment is effective, it may prove costly and possibly lead to foliage injury from reaction products with arsenicals or lime-sulphur.

Batjer (L. P.) & Haller (M. H.). **Fruit maturity and growth of Apple trees as affected by boron content. (Preliminary report.)** — *Proc. Amer. Soc. hort. Sci.*, xl, pp. 29–30, 1942.

This is a preliminary report on experiments carried out during 1940 in which soil applications of borax (at the rate of ½ lb. to 8 year-old and 1 lb. to 20 year-old trees) were made three weeks prior to blossoming to Jonathan, Delicious, Rome Beauty, Grimes Golden, and York Imperial apple trees growing in soil relatively low in available boron, but showing no definite symptoms of boron deficiency. The results showed no measurable effect on the growth of the trees after two seasons. The boron content of leaves and fruits of the treated trees averaged 45 and 50 parts per million, respectively, as compared with 30 and 13 p.p.m. for the untreated controls. Generally speaking, the treated trees showed more pre-harvest drop (23 to 45 per cent. as compared with 6 to 12 in the control), developed colour earlier, and produced a greater amount of breakdown and less scald in storage than the untreated ones, indicating that the borax treatment had advanced maturity.

Heinicke (A. J.), Reuther (W.), & Cain (J. C.). **Influence of boron application on preharvest drop of McIntosh Apples.** *Proc. Amer. Soc. hort. Sci.*, xl, pp. 31–34, 1942.

Soil applications of borax at the rate of ½ lb. per tree were given in 1940 to a 20-year-old block of 90 vigorous McIntosh apple trees in the Cornell University orchard at Ithaca, New York. The soil in this block had received unusually heavy nitrogen fertilization during the ten preceding years, but was low in available boron, the trees had suffered since 1934 from a heavier pre-harvest drop [cf. preceding abstract] than those in other parts of the orchard, the first definite symptoms of boron deficiency appearing in the spring of 1940. The applications resulted in 1941, when no external sign of boron deficiency was apparent, in a reduction in the pre-harvest drop (from 497 and 649 dropped fruits in two control trees to 62 and 99 in the treated trees) and in the drop through harvest (from 70 and 87 to 43 and 36 per cent. of the total yield) on trees which had previously exhibited severe external cork, but there was no definite effect in those free from cork. Analyses of the leaf tissue showed that the borax treatment reduced the drop even though there was not always an accompanying increase in the boron content of the leaf. The results of these experiments are taken to indicate that an excessive pre-harvest drop of fruit may be associated with incipient stages of boron deficiency which may not be severe enough to cause cork or drought spot.

Christopher (E. P.). **A comparison of lime sulphur and flotation sulphur spray on Apple trees.**—*Proc. Amer. Soc. hort. Sci.*, xl, pp. 63–67, 2 figs., 1942.

Comparative tests of lime-sulphur (1 in 50) and a flotation sulphur paste (10 lb. to 100 gals.) sprays on both mature and young McIntosh, Rhode Island Greening, and Baldwin apple trees, conducted at the Rhode Island Agricultural Experiment Station since 1936, showed that of the two materials lime-sulphur caused the greater reduction in carbon dioxide assimilation in the leaves (35 as compared with 18 per cent.) and the more severe leaf damage (15·74 and 25·99 per cent. of the leaf area injured as compared with 8·72 and 3·68), permitted less tree growth (1·87 and 1·93 in. trunk diameter as compared with 2·07 and 2·19), gave the smaller yields (mean total for six years of 78·0 and 29·4 bush. as compared with 116·5 and 66·2), and the smaller accumulations of starch in stored apples (13 per cent. of the pith area filled with starch grains as compared with 32). It is concluded that on account of its superiority flotation sulphur should be used instead of lime-sulphur.

Hildebrand (E. M.) & Hough (L. F.). **Pollenicides as supplements for bactericides in blossom blight control.**—*Proc. Amer. Soc. hort. Sci.*, xl, pp. 91–94, 1942.

In continued studies on the pollenicidal action of certain bactericides on apple trees [*R.A.M.*, xix, p. 658], elgetol and a new material, nitrokleenup powder, were both found in the laboratory to inhibit all pollen germination on agar at a dilution of 0·0001, whereas at dilutions as strong as 0·02 they were still only weakly bactericidal. In orchard trials spraying 10-year-old Rhode Island Greening apple trees with a 0·1 per cent. concentration of nitrokleenup, applied thoroughly with a knapsack sprayer at the time of pollination or 24 hours after, resulted in 20·2 and 15·5 per cent. of set fruits, respectively, as against 42·6 per cent. in the unsprayed trees, or 38·4 and 31·1 in the trees sprayed 48 and 72 hours after pollination, respectively. The only injury caused by spraying with this material consisted in a slight crinkling of the leaves. In the light of published and unpublished data on elgetol and the authors' own field work [the results of which were rendered inconclusive by frost], it is considered that this material is even more promising for fruit thinning, which, it is suggested, might help to control the blossom-blight phase of fire blight (*Erwinia amylovora*) by removing the late-opening blossoms. Further studies are in progress.

Allen (F. W.). **Carbon dioxide storage for Yellow Newtown Apples.**—*Proc. Amer. Soc. hort. Sci.*, xl, pp. 193–200, 1942.

In extensive commercial trials from 1938 to 1940 Yellow Newtown apples stored at 42° F. in a 6 per cent. concentration of carbon dioxide developed no internal browning (as compared with an average of 48 per cent. in air storage at 36°), and only a slight amount of incipient scald [*R.A.M.*, xxi, p. 82] in 4 out of 12 lots of unwrapped fruit. It is suggested that the absence of internal browning in carbon dioxide storage is due indirectly to the gas, which permits the use of temperatures above those employed in air storage, that is, temperatures above 40°, at and above which this disorder no longer occurs. Pre-storing for 15 days at 40° in relatively high concentrations of carbon dioxide appeared to be without effect on the subsequent development of internal browning in air storage at 32° or 36°, although it was materially more severe at the lower temperature.

Singh (U. B.). **Stem-brown disease of Apple in Kumaun.**—*Indian J. agric. Sci.*, xii, 2, pp. 368–380, 5 pl., 1942.

The fungus responsible for the stem-brown disease of apples, first observed in India at the Government Orchard, Chaubattia, Kumaun, United Provinces, in August, 1934, was identified by S. F. Ashby as *Botryosphaeria ribis*, infection by which usually originates on the pruned surfaces of twigs and stems and proceeds

downwards, causing a type of die-back [cf. *R.A.M.*, xvii, p. 755], the upper limbs being chiefly involved. The bark becomes loose and rolls outwards, turning brown and assuming a papery consistency, and the decorticated wood shows a dark brown discoloration with horizontal and longitudinal fissures. *B. ribis* is often found in association with *Coniothecium chomatosporum* [ibid., xx, p. 290] in the cankered areas. The symptoms of stem-brown are usually noticeable by the fourth week of April and reach a climax in the middle of May. Perithecia are rarely observed in nature. Detailed descriptions of all stages of the fungus are given.

After a month's immersion in snow diseased apple twigs bearing pycnidia, on examination in March, showed the presence of perithecia, the role of which in the spread of the pathogen has not been determined. It is clear, however, that overwintered material of this description is likely to provide a fresh source of inoculum for the coming season. Wounded and uninjured Esopus Spitzenberg twigs reacted to inoculation with the fungus by the development of typical bark symptoms and the production of B-type pycnidia, perithecia developing in the following year. The progress of infection was uniformly very slow. Cross-inoculation experiments with a mono-pycnospore isolation on cut pear, peach, apricot, and chestnut twigs [ibid., iii, p. 725] gave positive results.

The principal sources of the fresh infections occurring in nature from May to July are the pycnidia and, to a lesser extent, water-borne ascospores. Effective control may be secured by the application to the pruned stem surfaces of a paste consisting of equal amounts of red lead and copper carbonate in lanoline, the last-named being preferable for the purpose in view to the raw linseed oil used by Dey and Singh with the same fungicidal mixture against *C. chomatosporum* [ibid., xx, p. 290].

English (W. H.). **Taxonomic and pathogenicity studies of the fungi which cause decay of Pears in Washington.**—*Res. Stud. St. Coll. Wash.*, viii, 3, pp. 127–128, 1940. [Received September, 1942.]

In addition to the fungi already reported for the first time as agents of pear decay in N. America [*R.A.M.*, xx, p. 347], the authors here enumerate *Alternaria mali*, *Aspergillus flavus*, undetermined species of *Cephalosporium*, *Gloeosporium*, *Helminthosporium*, *Hendersonia*, *Pullularia*, and *Stemphylium*, *Hormodendrum cladosporioides*, *Neofabraea malicorticis*, *Penicillium chrysitis*, *P. cyclopium*, *P. puberulum*, *P.* (?) *roquefortii*, *P. terrestre*, *Phoma exigua* [ibid., xviii, p. 316], *Phomopsis* [*Diaporthe*] *ambigua* [ibid., xvi, p. 105], *Pleospora fructicola*, and *Sporotrichum malorum* [ibid., xx, p. 476] as new records for the same continent, while other fungi isolated from pears in Washington included *Cephalothecium* [*Trichothecium*] *roseum*, *Sclerotinia fructicola*, *Mucor piriformis*, *Phoma mali* [ibid., xvii, p. 466], and *Phytophthora cactorum*. At laboratory temperature the most actively parasitic isolates, in decreasing order of the rate of decay, were *Rhizopus nigricans*, *P. cactorum*, *S. fructicola*, *Botrytis cinerea*, a sterile fungus, *M. piriformis*, *D. ambigua*, *Alternaria mali* strain 4, *Aspergillus pyri*, *Helminthosporium* sp., *Penicillium expansum*, and *P. terrestre*. Common storage temperatures (40° to 54° F.) inhibited the parasitism of all but one of the isolates, while under cold storage conditions (32° to 35°) *Phytophthora cactorum*, *R. nigricans*, *A.* spp., *H.* sp., *Penicillium tardum*, *Stemphylium* No. 2, and a sterile fungus, proved incapable of causing decay, though *M. piriformis*, *Phoma mali*, *B. cinerea*, and *P. expansum* were comparatively active.

Huber (G. A.) & Baur (K.). **Apothecia of Sclerotinia fructicola on Peach in Western Washington.**—*Phytopathology*, xxxii, 7, pp. 635–636, 1 fig., 1942.

Sclerotinia fructicola, which causes considerable fruit decay of peach in Western Washington during the harvest period, may overwinter in mummies attached to trees and produce a fresh crop of moniliospores in the following spring [*R.A.M.*, xxi, p. 27]. On 26th March, 1941, apothecia were observed for the first time developing

from peach mummies below a single tree in an orchard in Clark County, the cultural characters of isolates from which resembled those of strains of *S. fructicola* from Italian prune mummies. Both prunes and peaches reacted positively to inoculation with pure cultures of the organism.

English (H.) & Gerhardt (F.). **Effect of carbon dioxide and temperature on the decay of Sweet Cherries under simulated transit conditions.**—*Proc. Amer. Soc. hort. Sci.*, xl, pp. 172–176, 1 graph, 1942.

Sweet cherries (variety Bing) inoculated with water suspensions of cultures of the brown rot fungus *Sclerotinia fructicola* [*R.A.M.*, xxi, p. 27] and of the blue mould fungus *Penicillium expansum* were stored in the summer of 1941 in atmospheres of carbon dioxide at concentrations of 5, 10, or 20 per cent. and at varying temperatures for either five or nine days, and examined either immediately after removal from storage or after two additional days in air at 65° F. Fruits kept at 31° in air without the addition of carbon dioxide developed no decay after either period of storage, indicating the possibility of controlling decay of cherries in refrigerator cars without using carbon dioxide by maintaining this temperature. At a storage temperature of 36°, no decay by either fungus developed either in air storage or in carbon dioxide after five days, nor was any *S. fructicola* present in any of the lots after nine; the 59 per cent. decay by *P. expansum* that developed in air storage after nine days at that temperature was reduced to 6·5 per cent. by 5 per cent. carbon dioxide and completely controlled by 10 per cent. At a storage temperature of 45°, *S. fructicola* was entirely absent from all lots after five days, and although present in air storage (40·2 per cent. decay) after nine, was completely controlled by the 20 per cent. concentration of the gas; *P. expansum*, present in air storage (72 per cent. decay) after five days was controlled by a 10 per cent. concentration of carbon dioxide, but after nine days the highest concentration of the gas reduced the amount of decay (to 4·1 from 85·6 per cent. in air storage) without completely controlling it. All lots examined after two additional days in the air at 65° were infected, although those kept in carbon dioxide developed less decay than those stored in air at the same temperature. Data for uninoculated cherries stored under the same conditions showed no significant amount of decay in any of the lots after five days, or even when examined after two additional days in the air at 65°; stored for nine days and examined after two additional days in the air, the lots held in air had two to three times as much decay as those in 20 per cent. carbon dioxide at either 36° or 45°. The fungi isolated from the lesions on these cherries, in descending order of incidence, were *Botrytis* sp., *Cladosporium* sp., *Pullularia* sp., *Hormodendrum* sp., *Stemphylium* sp., *Penicillium* sp., and *Mucor* sp. It is concluded from the results of these studies that brown rot and other kinds of decay can be effectively controlled by carbon dioxide at concentrations within the range used in commercial shipping. This conclusion is also supported by records taken of unspecified decay in cherries developing during transit and by data supplied by shippers of cherries from California.

Zeller (S. M.) & Milbrath (J. A.). **Banded chlorosis, a transmissible disease of Cherry.**—*Phytopathology*, xxxii, 7, pp. 634–635, 1 fig., 1942.

Japanese cherries (*Prunus serrulata*) of the Amanogawa, Okochin, and Temari varieties in Oregon were observed in 1940 to be affected by a disease termed 'banded chlorosis' (*Marmor pallidolimbatus* or *Prunus* virus 10), the outstanding feature of which was the development on the leaf surface of discoloured areas surrounded by a chlorotic band, 1 to 2 mm. broad, sometimes describing a circle and forming ring spots, singly or in chains, usually between two lateral pinnate veins or along the margin, while in other cases more or less perfect 'oak leaf' patterns extend from the midvein to points on the lateral ones, or, again, only a sector between the margin and the midrib may be involved. The chlorotic areas are whitish or yellowish, sometimes

becoming pinkish. Amanogawa trees of 16 years old or more also suffered from a die-back of the twigs, which may not, however, be directly caused by the virus. Numerous cases of bud perpetuation of the disease were observed in nurseries, and the disorder was successfully transmitted by means of Amanogawa buds to nine out of ten healthy mazzard seedlings.

PLAKIDAS (A. G.). **Spray tests for the control of Strawberry leaf spot caused by Mycosphaerella fragariae.**—*Rep. La Fruit Exp. Sta., 1939–40*, pp. 25–28, 1941. [Abs. in *Chem. Abstr.*, xxxvi, 13, p. 3898, 1942.]

Excellent control of strawberry leaf spot (*Mycosphaerella fragariae*) was secured at Hammond, Louisiana, by spraying with standard Bordeaux 4–4–50 or 'spraycrop' (containing 34 per cent. copper and no free lime). Slight foliar injury resulted from the use of Bordeaux mixture, whereas 'spraycrop' caused no damage.

BERKELEY (G. H.) & PLAKIDAS (A. G.). **Strawberry leaf roll, a new disease.**—*Phytopathology*, xxxii, 7, pp. 631–633, 1 fig., 1942.

In June, 1938, at St. Catharines, Ontario, and in September, 1940, at Geneva, New York, strawberry plants (Premier variety in the former and U.S.D.A. No. 1631 and Geneva No. 9270 seedlings in the latter locality) were observed to present a delicate appearance and to be affected by a downward rolling of the leaflets, which in extreme cases assumed the form of a funnel-shaped tube. The leaves of the diseased plants were pale green, smaller and narrower than the normal, the petioles being unusually long and spindly. The leaf blades were ruffled, rugose, and bore irregular, chlorotic areas of variable size. Grafting experiments with runners were successful in a few cases, including one involving the transmission of the pathological conditions to a clone of *Fragaria virginiana* and its two daughter plants. The disorder, termed leaf roll, is attributed to a hitherto unrecorded virus.

SNELL (W. H.). **The production of sporidia of Cronartium ribicola on cultivated Red Currants in relation to infection of White Pine.**—*Amer. J. Bot.*, xxix, 7, pp. 506–513, 1942.

Considerable data upon the number of leaves, total leaf area, and number of teleutosori and sporidia of *Cronartium ribicola* per bush for cultivated red currants, cultivated European black currants, and wild gooseberries (*Ribes cynosbati* and *R. rotundifolium*) [*R.A.M.*, xxi, p. 29] showed that even under maximum infection conditions, a garden row of red currants produces only a fraction of the number of sporidia produced by wild gooseberries and an even smaller fraction of the number produced by black currants. Factors reducing the total sporidium production on red currants are (1) the small number of bushes that become infected, (2) the high resistance of mature leaves, (3) the tendency to produce a single set of leaves in a season, (4) the lowered viability of the teleutospores and sporidia produced, (5) early defoliation, (6) necrosis of blister-rust spots, and (7) the reduced size of the teleutosori.

By the use of the 'threshold' or 'quantum' principle (which derives a certain theoretical volume of sporidia for the production of a single canker on pine) it is demonstrated that the maximum sporidium production by red currants in New York State is close to or even under the lowest limits necessary for the infection of pine.

The results indicate that red currants offer little if any danger of infection by *C. ribicola* to white pine; the necessity of applying the 900 ft. eradication zone to them in gardens [loc. cit.] remains to be proved.

WARDLAW (C. W.). **Banana research at the Imperial College of Tropical Agriculture, B.W.I.**—*J. R. Soc. Arts*, xc, 4621, pp. 644–653, 1942.

In this address to the Royal Society of Arts, London, delivered on 4th February,

1942, the author briefly reviews in popular terms research work carried out in Trinidad since 1928 on Panama disease of bananas (*Fusarium oxysporum* [var.] *cubense*) [*R.A.M.*, xxi, pp. 241, 340], with special reference to breeding for resistance and to storage investigations. He states that the hybrid I.C. 2, after showing a degree of resistance almost amounting to immunity over a number of years at the Imperial College, suddenly, when transplanted to two other localities in Trinidad, manifested complete susceptibility. Planting material of this hybrid sent to Jamaica also proved subject to infection. No reason appears to have been adduced for this behaviour, but it is thought that bud mutation may possibly be involved.

Report on the Department of Agriculture, St. Lucia, 1941.—12 pp., 1942.

On p. 10 of this report it is mentioned that the incidence of Panama disease of bananas (*Fusarium* [*oxysporum* var.] *cubense*) revealed by the 1941 survey amounted to 5·41 per cent., an increase of 1·40 per cent. over the previous year (cf. *R.A.M.*, xix, p. 717), the percentages of infected plants in gardens under and over three years old being 2·98 and 5·95 per cent., respectively.

Pontis (R. E.) & Hansen (H. N.). **Olive anthracnose in the United States.**—*Phytopathology*, xxxii, 7, pp. 642–644, 1 fig., 1942.

Mission olive fruits at the University of California, Berkeley, were observed in December, 1941, to bear the typical brown, irregular, depressed lesions, later turning brick-red or black, of the anthracnose fungus, *Gloeosporium olivarum* [*R.A.M.*, xxi, p. 403]. In Portugal and Greece [ibid., xiii, p. 789] the disease is responsible for considerable damage, and there are indications that it may also assume a severe form in California. The organism exhibited the so-called 'dual phenomenon' [ibid., xvii, p. 830] in monospore cultures on potato dextrose agar, one type producing an abundance of mycelium and few conidia, while in the other the position was reversed. Both mycelial and conidial types of the fungus were about equally pathogenic to injured olive fruits, the symptoms appearing after 36 hours and acervuli developing a week later. This is believed to be the first record of *G. olivarum* in the United States.

Chace (W. G.) & Urlaub (G. S.). **A new culture medium for the growth of Chaetomium globosum.**—*Amer. Dyest. Reptr*, xxxi, 14, pp. 331–333, 3 figs., 1942.

The following cellulose agar medium was found at the Lowell Textile Institute to be superior to Czapek's agar for the development of *Chaetomium globosum*, large quantities of the spores of which are required for the testing of mildew-proofed fabrics [*R.A.M.*, xxi, p. 288]: 1,000 ml. water (tap or distilled with a trace of ferric sulphate), 3 gm. sodium nitrate, 1 gm. potassium dihydrogen phosphate (buffering the substratum at P_H 5·0), 25 gm. magnesium sulphate, 0·25 gm. potassium chloride, 15 gm. agar, and 10 gm. filter paper. The use of this medium reduces the time needed for sporulation to four or five days, permits the production of spore quantities many times exceeding those obtainable on Czapek's agar, and virtually eliminates the common air-borne contaminants.

Herrick (J. A.). **A simple technique for aseptic handling of media.**—*Phytopathology*, xxxii, 7, pp. 636–637, 1942.

The technique successfully developed by the writer at the Kent (Ohio) State University for the aseptic manipulation of liquid culture media consists essentially in the use of a transfer chamber 20 by 30 by 30 in., the walls and ceiling of which are formed by pieces of cheese-cloth soaked in 3 per cent. lysol solution. When all sterilized equipment, media, etc., have been placed in the chamber, the air is thoroughly sprayed with a disinfectant solution, and other precautions [which are indicated] taken for the exclusion of external contamination. The technique may be of value where equipment is very limited or more elaborate apparatus impracticable to use.

HANSEN (H. N.). **Heterocaryosis and variability.**—*Phytopathology*, xxxii, 7, pp. 639–640, 1942.

Having observed that several mycologists are under a misapprehension as to the relationship between heterocaryosis and variability in fungi [*R.A.M.*, xvii, p. 830], the writer briefly discusses the nature and origin of heterocaryosis and its connexion with the development of mutants. He points out that the term heterocaryosis precisely describes the condition of a cell containing two or more genetically different nuclei. This condition is induced either by mutation within a plurinucleate entity or by fusion or anastomosis between cells having genetically unlike nuclei. When fungi in the heterocaryotic condition are isolated and cultured they may give the impression of great variability by producing tufts, patches, or sectors differing from the main growth. Heterocaryosis may therefore appear to induce variability, but in reality the basic cause of variability and the primary cause of heterocaryosis is mutation.

HASELHOFF (E.). **Die landwirtschaftlichen Versuchsstationen als Werkstätten der agrikulturchemischen Forschung.** [The agricultural experiment stations as laboratories of agricultural-chemical research.]—107 pp., Berlin, Gebr. Borntträger, 1941. [Abs. in *Z. PflKrankh.*, lii, 6, pp. 316–317, 1942.]

This account of the functions of the German agricultural experiment stations, dealing primarily with their work in connexion with soil science and plant and animal nutrition, contains a short chapter on plant diseases. Before 1906, when the plant protection service was reorganized by the Biological Institute, phytopathological problems were investigated by the experiment stations, and since that date some of the stations have continued to co-operate with the Biological Institute along both scientific and practical lines. Uniformity in the organization and procedure of the plant protection service was only attained under the provisions of the law of 5th March, 1937 [*R.A.M.*, xvi, p. 640], governing the care of economic plants.

OCFEMIA (G. O.). **Geographical distribution of virus diseases of plants with special reference to the Philippines.**—*Proc. sixth Pacif. Sci. Congr.*, iv, pp. 745–748, 1939 (1940). [Abs. in *Biol. Abstr.*, xvi, 6, p. 1456, 1942.]

The author discusses the geographical distribution and the transmission of Fiji disease and mosaic of sugar-cane, the bunchy top diseases of banana and abacá [*Musa textilis*], and infectious chlorosis of bananas, which may be identical with the the abacá bunchy top. Sugar-cane sereh disease and streak and rice stunt have not yet been found in the Philippines.

VALLEAU (W. D.). **Virus nomenclature and classification.**—*Chron. bot.*, vii, 4, pp. 152–154, 1942.

The author opposes Bawden's suggestion (*Chron. bot.*, vi, pp. 385–386) to adopt a catalogue of approved names of viruses and any attempt at a preliminary general scheme of virus classification [*R.A.M.*, xxi, p. 343]. He proposes that as soon as viruses affecting certain groups of plants have been sufficiently studied to demonstrate their relationships to one another and to some of the well-known viruses, they be assigned binomials which would either place them in recognized genera, or, if evidence warranted, in newly established ones; for those not sufficiently studied, the generic name *Marmor* might be used.

MACRAE (RUTH). **Interfertility studies and inheritance of luminosity in Panus stypticus.**—*Canad. J. Res.*, Sect. C, xx, 8, pp. 411–434, 21 figs., 1 diag., 1942.

All five collections of *Panus stypticus* [*R.A.M.*, xiv, p. 270] from Europe examined in this study were found to be non-luminous, while all ten from North America were luminous. Series of pairings in all possible combinations of monosporous mycelia

from single sporophores showed that both forms of the fungus are heterothallic and tetrapolar. With three exceptions, complete fertility existed between monosporous mycelia of all the collections paired. The diploid mycelium and hybrid fruit bodies in the F_1 generation from a cross between the luminous and non-luminous forms were luminous and the haploid mycelia separable into two approximately equal luminous and non-luminous groups, indicating that luminosity in this species is an inherited character governed by a single pair of Mendelian factors, luminosity being dominant over non-luminosity, and that luminosity factors form all possible combinations with the interfertility factors.

Dufrénoy (J.) & Reed (H. S.). **Coacervates in physical and biological systems.**—*Phytopathology*, xxxii, 7, pp. 568–579, 6 figs., 1942.

In further studies at the University of California, Berkeley, on the vacuolar inclusions found in the cells of plants suffering from various pathological conditions, e.g., mottle leaf (zinc deficiency) in orange [*R.A.M.*, xiv, p. 628] and zinc and boron deficiency in sunflower [ibid., xix, p. 727], attention was directed to the roots and buds as well as to the foliage. 'Coacervates', the term propounded by De Jong and Kruyt to describe the bodies rich in colloids immersed in a liquid relatively poorer in colloids, were observed in the vacuoles of all the organs examined in the case of plants grown in solutions lacking one or more of the essential supplementary trace elements. The morphology, distribution, and staining reactions of the coacervates are fully described. The inclusions appear to consist of a central mass of phenols or polyphenols surrounded by a layer of phospholipoid material, formed as a sequel to the disturbance of hydrogen bonds in the catechol-water system by the activity of a catechol oxidase.

Hansen (H. P.). **Om Nomenklatur for Plantevira samt nogle Synonymer for Kartoffelvira og Kartoffelviroser.** [Nomenclature of plant viruses and synonyms of Potato viruses and Potato virus diseases].—*Tidsskr. Planteavl*, xlvi, pp. 363–373, 1941. [Abs. in *Chron. bot.*, vii, 4, pp. 172–173, 1942; and in *Biol. Abstr.*, xvi, 7, p. 1654, 1942.]

In this paper synonyms for the European potato viruses are listed and Danish names given for potato virus diseases arranged according to symptoms [*R.A.M.*, xvii, p. 338].

Caldwell (J.). **The production of virus-free Potatoes in the south-west of England.**—*Ann. appl. Biol.*, xxix, 3, pp. 265–267, 1942.

A preliminary survey in the autumn of 1936 showed that in isolated parts of Cornwall and Devon potatoes had been grown from seed saved on the same farm for many years. Many of the stocks were comparatively free from virus diseases, comparing favourably in this respect with crops from imported seed. It was apparent that certain localities in both counties were very suitable for the production of clean stocks of potatoes. Also, crops from local seed matured earlier than similar crops from Scots or Lincolnshire seed. Much of the area also conforms to the requirements for districts with low aphis counts; the climate is humid, and the wind velocity high.

Twelve places were selected for experiment, spread over the whole peninsula and conforming with the requirements for high wind and high humidity. The growers participating in the work were asked to grow the stocks provided for at least two years, at as great a distance as possible from other potatoes. The stocks selected were Sharpe's Express, Arran Pilot, May Queen, Duke of York, Dargill Early, and Arran Consul. Except for Dargill Early, a sample of each was grown at Exeter under controlled conditions to keep a check on the growth made. One lot of each of two varieties was sent to every grower before the end of 1936. In the spring of 1937, the author examined the plants and a few doubtful ones were removed and burnt. The entire crop was stored, the growers taking care that no aphids were present during

storage. During 1938 all the centres were visited by official inspectors and the health of the plants was carefully observed. At Exeter a comparison was made between the time of maturity of a crop from Devon-grown seed and one from imported Scots seed. An interval of about three weeks elapsed between the ripening of the two stocks, the plants from the seed grown locally being consistently ahead of those from the Scots-grown seed. One stock which became badly infected with virus disease was probably infected by aphids present in the store, and this may be an important factor in the spread of viruses in this area.

The evidence obtained showed clearly that large quantities of seed potatoes could readily be produced on Dartmoor, Bodmin Moor, and parts of Exmoor. In many other areas the conditions are also satisfactory, and a great part of west Devon and Cornwall would be suitable. In many areas this industry would provide a profitable use for land that is not at present successfully cultivated. Two precautions should, however, be taken: varieties must be grown in isolation, and the custom of permitting workers to grow a few rows of their own seed in the middle of a crop should cease.

Bonde (R.). **Ring rot in volunteer plants.**—*Amer. Potato J.* xix, 7, pp. 131–133, 1942.

Experimental evidence has been accumulated in Maine since 1934 to show that the causal organism of potato ring rot [*Corynebacterium sepedonicum*] does not survive the winter in the soil of fields carrying severely diseased crops in the previous season. It was, however, found to persist through the winter of 1940-1 in Katahdin tubers kept in trenches about 6 in. below the surface of the soil and covered to surface-level, part of each lot being further protected against cold with a shallow layer of weeds and potato tops. The incidence of survival of *C. sepedonicum* in the plants developing from the 65 to 82 per cent. of the tubers that withstood the winter ranged from 42 to 57 per cent., the higher figure occurring in the portion of a lot receiving no additional protection. Growers are therefore advised to plant their seed plots on fresh sites, and to make sure that any volunteer potato plants are destroyed.

Hastings (R. C.). **New developments on certifying seed Potatoes.**—*Amer. Potato J.*, xix, 7, pp. 149–152, 1942.

Potato ring rot [*Corynebacterium sepedonicum*] is stated to have multiplied the problems of seed certification [*R.A.M.*, xxi, p. 263], necessitating further field inspections in addition to the two normally required, with a consequent increase in cost to be borne ultimately by the growers. During the past season, one or more diseased plants were found in 5,000 of the 37,000 acres surveyed in North Dakota, and six or eight carloads were rejected in the south on account of ring rot.

Levitt (J.). **A histological study of hollow heart of Potatoes.**—*Amer. Potato J.*, xix, 7, pp. 134–143, 1942.

In a study at the North-Central (Grand Rapids) branch of the Minnesota Agricultural Experiment Station on hollow heart of potatoes [*R.A.M.*, xix, p. 645 and next abstract], 2,818 Irish Cobbler tubers planted on 15th May, [? 1941] were examined at successive harvests between 24th July and 17th September, and 65 were found to be suffering from the disorder, the incidence of which was four times as heavy in the first as in the last crop, contradicting the popular belief that the trouble does not originate until late in the growing season. Fully developed hollows (up to or exceeding 10 by 20 mm.) were ordinarily observed only in large tubers and the incipient stages of the disease (necrotic patch surrounded by wound cambium or hollows up to 5 by 10 mm.) in small ones.

The first sign of hollow heart was a group of several dead, brown cells in the pith, some still occupied by starch grains. Surrounding the dead cells were several rows practically devoid of starch, in which some cell division had already taken place. At a later stage, the group of dead cells was partially or completely encircled by a

cambium layer of several rows. The next phase was characterized by the formation of a small cavity, almost entirely surrounded by a row of dead, brown, collapsed cells of unrecognizable structure, ruptured in places, and in turn encircled by several rows of living cambium cells and an outer radius of relatively starch-free cells. With the further advance of the disease the cavity became larger and somewhat more elongated in the short axis of the tuber, but even at this stage the wound cambium cells were disposed in distinct radial columns, showing that only periclinal divisions were involved. Neither the dead cell layer nor the wound cambium layer completely encircled the cavity, into which, however, some elongated or spherical cells protruded, and when the hollow had attained its full size almost the whole surface was lined with living tylosis-like cells, which were sausage- or flask-shaped or spherical and frequently larger than the adjacent tissue cells. In the mature tubers the middle lamella of the cells surrounding the wound was suberized, judging by its reaction to Sudan III stain, yet the cells were still living, according to their response to vital staining with neutral red, plasmolysis, and streaming movement.

These observations show that the hollow-heart cavity is not of lysigenous origin, since no cell disintegration or absorption occurs, nor is it the simple type of schizogenous hollow arising from the separation of living cells at the middle lamella and resulting in a giant intercellular space. Its formation is preceded by the death of a patch of cells and the development round them of a wound cambium.

The rough correlation between tuber size and the dimensions of the hollow cavity agrees with the assumption that hollow heart is a growth phenomenon, both the extent and shape of which are explicable by a non-uniform development of the tuber outside the necrotic region, so that the periphery expands more rapidly than the centre. The supposition was confirmed by cell measurements on diseased Russets.

In view of certain analogies between the hollow-heart condition of potatoes and that of apples suffering from boron deficiency [ibid., xix, p. 353], spectrographic analyses were made of six mineral constituents (potash, copper, magnesium, iron, manganese, and calcium) in diseased (average weight 145 gm.) and sound tubers (118 gm.), and all were found to occur in significantly smaller quantities in the former than in the latter.

CORDNER (H. B.). **A study of problems relating to production of fall-crop Irish Potatoes in Oklahoma.**—*Bull. Okla. agric. Exp. Sta.* B—258, 59 pp., 4 figs., 11 graphs, 1942.

A detailed, fully tabulated report is given of investigations which have been in progress at the Oklahoma Agricultural Experiment Station since 1937 to determine the causes of failure of the autumn potato crop obtained from spring crop tubers planted in July and August. The following are among the conclusions drawn. High soil temperatures, e.g., between 90° and 95° F., were found to be responsible for severe damage to potato seed, a mean of 90° at planting time resulting in a substantial reduction of stand. This form of high temperature breakdown presents analogies with black heart [*R.A.M.*, xxi, p. 302], the condition in both cases arising from physiological sources and being associated with a high respiratory rate and oxygen deficiency in the tuber tissues. The use of freshly cut seed pieces at the critical period for high soil temperatures was found to afford valuable protection against the trouble under observation, possibly by permitting an increased supply of oxygen to the interior tissues, at any rate for the first week or two after planting when the demand is greatest. At this time, too, sprouting may be initiated, and the sprouted seed is less subject to high-temperature breakdown; cut sets sprout more promptly than whole tubers—an additional reason for their use under the conditions indicated. Storage of the spring crop seed tubers at 50° was found to be inferior to a temperature of 75° to 80° for this purpose, the chilled sets sprouting less rapidly in the field than those stimulated by the warmth.

THIRUMALACHAR (M. J.). **Puccinia droogensis Butler on Berberis aristata D.C.**—*Curr. Sci.*, xi, 7, pp. 282–283, 7 figs., 1942.

A description is given of *Puccinia droogensis* Butl. (*Indian For.*, xxxi, p. 670, 1905) collected on *Berberis aristata* at Kodaikanal, Madras, in 1940. The single distinct germ pore in each teleutospore of the rust clearly differentiates it from the species of *Cumminsiella* recorded on other *B.* spp. by Arthur [*R.A.M.*, xiii, p. 185]. *P. droogensis* is autoecious, and its aecidial stage differs from that of *Aecidium montanum* Butl. on *B. aristata*, *B. lycium*, and *B. coriaria* both in the absence of the witches' brooms produced by the latter rust and in spore dimensions (17 to 35 by 17 to 29 μ, average 19 by 23 μ in *A. montanum* as against 18 to 22 by 16·4 to 18 μ in *P. droogensis*).

BISBY (G. R.). **Mycological nomenclature.**—*Phytopathology*, xxxii, 7, pp. 644–645, 1942.

The author proposes two changes involving Articles 4 and 57 in the International Rules of Botanical Nomenclature, viz., (1) the legalization of the conservation of specific names which have become firmly established in the literature through many years' extensive usage; and (2) the designation of Ascomycetes and Basidiomycetes (not Phycomycetes) with pleomorphic life-cycles by the first valid binary name applied to the perfect stage, though the name of the imperfect stage may be retained in cases where ambiguity might arise from its discontinuance. In connexion with (1) it is pointed out that the specific epithets in the names *Tilletia tritici*, *T. levis*, *Ustilago levis*, and *Rhizopus nigricans*, though disallowed by the existing rules, will continue to be used, as also will about a score of pre-Friesian names of powdery mildews recognized by Salmon and all subsequent workers; while as regards (2) the retention of *Cladosporium herbarum* should be permitted, notwithstanding the discovery and verification of its perfect stage, *Sphaerella tulasnei*, at any rate in countries where only the former phase is known.

HENDERSON (R. G.). **Breeding Tobacco for black-root resistance.**—Abs. in *Phytopathology*, xxxii, 7, p. 647, 1942.

In the course of eight years' work on the breeding of tobacco for resistance to black root rot (*Thielaviopsis basicola*) in Virginia, crosses have been made between a resistant variety of Turkish (Xanthia) and susceptible flue- and dark fire-cured strains. The F_1 progeny resembled the Turkish parent in being resistant to the fungus and most other characters, and selections from the F_2 and F_3 populations also proved highly resistant to *T. basicola*. In experiments on the back-crossing of the F_2 and later generations to the susceptible parent, a high level of resistance was maintained, especially from the F_3 onwards, but the leaves remained undesirably small, a second back-cross being required to produce full-sized foliage.

In 1941 several resistant hybrids of the flue-cured type were tested on soil infested with *T. basicola*, one of which, No. 38, combined resistance to black root rot with heavy cropping and a suitable growth habit. The growth of resistant hybrids proceeded at a uniform rate from their establishment in the field to the attainment of full height, whereas that of susceptible plants was retarded by root rot during the first two months of the vegetative period.

JOHNSON (J.) & FULTON (R. W.). **The broad ring-spot virus.**—*Phytopathology*, xxxii, 7, pp. 605–612, 2 figs., 1942.

A new virus observed in 1938 on some 30 per cent. of the plants in a tobacco crop nearing the topping stage in Wisconsin has been designated 'broad ring spot', inoculation with extracts of which on young Havana No. 38 plants produced on the leaves small, chlorotic rings, two or more such rings being often disposed concentrically, and puckering of the veins. The disease has not been observed in any

other field and not in the original field since 1938. It is therefore extremely rare. Systemic symptoms appear on two or three young leaves, the succeeding three or four of which may be apparently healthy and the next diseased. The infective principle was found to be present in the leaves showing no symptoms, which reacted negatively to inoculation with the broad ring-spot virus, but positively to the introduction of potato ring spot, ordinary tobacco ring spot, tobacco ring spot No. 2, or lucerne mosaic [*R.A.M.*, xv, p. 831; xix, p. 668]. During the early autumn and late spring, when greenhouse temperatures rise, the chlorotic type of spotting is partially replaced by fine, brown, necrotic circles, which were also characteristic of the disease in the field. John Baer tomatoes inoculated with broad ring spot developed well-marked chlorosis and necrotic rings, the latter being rather broader than those on tobacco and following the course of the veins to a greater extent; the leaflets showed considerable distortion.

The new virus is readily transmissible by mechanical inoculation, especially with the aid of carborundum, but apparently not by *Myzus persicae*. Its thermal death point is 54° C., its maximum longevity *in vitro* 42 hours, and its dilution end-point just above 1 in 1,000. It does not appear to be filterable by ordinary methods. Forty-one named plants belonging to 16 families were successfully inoculated with the broad ring-spot virus. Most of these potential hosts developed a mild, vermiculate, chlorotic pattern, but on sunflower the virus produced chlorotic rings and on cucumber scattered, yellow spots, while the foliage of *N. glutinosa* and *N. sylvestris* was much distorted. Squash and potato were the only two plants on which infection remained localized.

Helson (G. A. H.). **The leaf hopper Thamnotettix argentata Evans, a vector of Tobacco yellow dwarf.**—*J. Coun. sci. industr. Res. Aust.*, xv, 2, pp. 175–184, 1 fig., 3 graphs, 1942.

All attempts to breed *Thamnotettix argentata* [*R.A.M.*, xx, p. 604], a vector of tobacco yellow dwarf, upon tobacco are stated to have failed. Many of the hosts on which the insect breeds are common weeds in tobacco fields or neighbouring pastures, and on these it produces three generations every year in northern Victoria.

Field observations in Victoria in 1940–1 showed that the insect bred on capeweed (*Cryptostemma calendulaceum*) and crowfoot (*Erodium* sp.) and increased considerably before the death of these weeds at the end of November. First-generation adults, which had then reached a peak of abundance and appeared to be carrying the virus, were forced on to the young tobacco crop for want of other food. Symptoms of the disease appeared about a fortnight later.

Valleau (W. D.), Johnson (E. M.), & Diachun (S.). **Association of Tobacco leafspot bacteria with roots of crop plants.**—*Science*, N.S., xcvi, 2485, p. 164, 1942.

The authors continued their investigations on tobacco wildfire (*Bacterium tabacum*) [*Pseudomonas tabaca*] and angular leaf spot (*Bact. angulatum*) [*P. angulata*], with particular reference to the source of inoculum in tobacco plant-beds [*R.A.M.*, xxi, pp. 308, 431]. Roots of cover crops, including wheat, barley, rye, crimson clover [*Trifolium incarnatum*], and vetch from artificially contaminated soils out-of-doors and from fields where the diseases had been severe in 1941 were washed free from soil in running water, and ground in a mortar. When this material, diluted with water, was poured over the surface of artificially water-soaked tobacco leaves, severe infection frequently resulted. Tobacco roots from naturally infected beds also gave heavy infection when used in this way. *P. angulata* was also isolated from seedling tobacco roots before the disease appeared on the leaves in untreated beds, and from tobacco roots in beds treated with Bordeaux mixture. It is, therefore, not unlikely that both organisms may be carried from the plant-bed to the field on the roots of

healthy plants, and serve as a source of sudden outbreaks in the field after a long wet period.

Microscopic examination of tobacco rootlets from naturally infected plant-beds and artificially inoculated tobacco roots growing in sand showed the presence of masses of bacteria; pieces of roots bearing these colonies when used as inoculum produced heavy infection by either disease (depending on the source) on water-soaked tobacco leaves.

P. tabaca and *P. angulata* are able to maintain themselves on the roots of several unrelated crop plants for at least six months, and under certain natural conditions they are able to cause specific leaf spot diseases of several unrelated plants, such as tobacco, tomato, morning glory [? *Ipomoea* sp.], and cowpeas. In the opinion of the senior writer these bacteria are not primarily tobacco pathogens at all, but merely common (though specific) organisms present on roots, perhaps of native vegetation, and which under specially favourable circumstances cause specific leaf spots of tobacco.

Lyon (C. B.), Beeson (K. C.), & Barrentine (M.). **Macro-element nutrition of the Tomato plant as correlated with fruitfulness and occurrence of blossom end rot.**—*Bot. Gaz.*, ciii, 4, pp. 651–667, 11 figs., 1942.

When 1,044 plants of an inbred strain of Bonny Best tomatoes were grown in sand culture, and the effects of 87 different nutrient solutions varying in the relative proportions of macro-nutrient elements (equal amounts of boron, manganese, zinc, copper, and iron being supplied in each case) were studied statistically in relation to fruitfulness and the occurrence of blossom-end rot, it was found that variations in the amount of calcium and nitrate in the nutrient medium resulted in greater differences in fruitfulness over wider ranges in concentration than did the other elements. The greatest fruitfulness resulted in treatments high in nitrate and low in sulphate and phosphate in the anion triangle (for convenience the nutrient relations are represented in cation and anion triangles and treatment numbers assigned to those solutions used) and in treatments high in calcium and low in magnesium and potassium in the cation triangle. The percentage of rotted fruits on each plant increased as the calcium concentration of the medium decreased; this correlation was largely independent of the magnesium and potassium concentrations, and no correlation with any anion was found. Fruits from treatments inducing the most severe rotting were low in calcium and high in potassium and magnesium. The occurrence of blossom-end rot was clearly associated with calcium nutrition.

Hildebrand (E. M.). **A micrurgical study of crown gall infection in Tomato.**—*J. agric. Res.*, lxv, 1, p. 45–59, 7 figs., 1942.

In studies with the crown gall organism, *Phytomonas* [*Bacterium*] *tumefaciens* [*R.A.M.*, xxi, p. 67], inoculation of Bonny Best tomato plants was carried out with the help of a micrurgical apparatus consisting of a double Chambers micromanipulator and accessories arranged for the isolation of bacteria under one microscope and their immediate inoculation into a plant under a second one. Single cells of the organism were found to grow and multiply readily in sterile juice extracts from young tomato plants; and also in the sap in wound cavities, isolation from wound tissue five days after inoculation with a single bacterial cell and before symptoms appeared yielding thousands of bacteria. Inoculation of single plant cells made by means of a micropipette, which caused wounds of only 3 μ and did not kill the plant cells, failed to induce gall formation, thus indicating that the interior of living cells is not a favourable medium for the survival of these bacteria. The smallest wounds in which infection occurred, involving one to several epidermal cells, were produced by gently stroking the stems and petioles of tomato plants with a smooth polished needle moistened in a suspension of *Bact. tumefaciens*, tiny galls developing within five days of inoculation. It was estimated that less than 5 per

cent. of plant cells injured became infected. When shallow stem wounds, about 0·1 mm. in diameter and from 2 to 12 cells deep, were inoculated with one or more bacterial cells, it appeared that the percentage of infection was somewhat higher and the galls larger when more than one bacterial cell was used and deeper wounds inoculated: single bacteria induced gall formation in about 10 per cent. of the plants. 2 to 10 bacterial cells in 15, and 50 to 100 bacterial cells in 21 per cent. of the plants. In tests with deep wounds piercing one-fourth, one-half, and the whole of the stem, the largest galls were again associated with the deepest wounds; single bacteria produced infection in from 10 to 60 per cent. of plants, 2 to 10 bacteria in from 20 to 90 per cent., and 50 to 100 bacteria in practically every case. It appeared that the largest galls resulted from inoculation of deep wounds irrespective of the number of bacteria used in the inoculum, indicating that the depth of the wound is a more important factor in producing infection than the number of bacteria used as inoculum. It is suggested in explanation of these results that a single bacterial cell has less likelihood of finding the proper location for multiplication in the wound cavity than have larger numbers, and that deeper wounds are more favourable for infection on account of larger amounts of wound sap present. Isolations from galls from all experiments showed that bacterial population is roughly proportional to gall size.

Hartman (J. D.) & Samson (R. W.). **Wheel injury to Tomatoes during spraying and dusting operations.**—*Proc. Amer. Soc. hort. Sci.*, xl, pp. 467–470, 1 fig., 1942.

Data from spraying and dusting experiments carried out during 1941 in Indiana, in which a tractor-drawn sprayer on rubber-tyred wheels and a duster on steel-rimmed wheels, both equipped with special vine shields in front of each wheel, were used, showed that the wheel damage inflicted on tomatoes during these operations resulted in an average reduction in yield of 5 per cent. on rows injured on one side only, and of 8 per cent. in rows injured on both sides. The degree of injury was approximately the same whether the spraying and dusting took place five times or twice during the season. On the basis of these data, the average reduction in yield is estimated as being 2·3, 1·8, 1·4, and 0·7 per cent. for 6, 8, 10, and 20-row sprayers, respectively.

Blood (L. H.). **Scientists seek Tomato varieties resistant to Verticillium wilt.**—*Fm Home Sci., Utah*, ii, 4, pp. 5, 8, 2 figs., 1941.

Wilt (*Verticillium albo-atrum*) [*R.A.M.*, xx, p. 345; xxi, p. 3] is the most devastating but least conspicuous disease of tomatoes in Utah, where it causes losses of over $100,000 to growers every year. Infected plants average 30 to 60 per cent. smaller yields than healthy ones of the same variety. The 1941 epidemic caused a reduction of over 50 per cent. in the crop on many acres in Davis and Weber Counties.

Oyler (Enid) & Read (W. H.). **A stem rot of Tomato caused by Didymella lycopersici.**—*Gdnrs' Chron.*, Ser. 3, cxii, 2910, p. 120, 3 figs. (2 on pp. 121, 122), 1942.

Tomato canker (*Didymella lycopersici*) [*R.A.M.*, xix, p. 500] is stated to have caused very serious losses in the Lea Valley area in 1906; it then became progressively less important, only occasional specimens being received at Cheshunt between 1918 and 1940, until 1941, when a severe outbreak occurred in one nursery. Steam sterilization of the soil in which the affected crop had grown was resorted to, but the year following the disease reappeared, specimens also being received from nine other counties.

Under commercial conditions, infection does not occur until after the plants have been put into the houses. 'Soft' plants readily become attacked, while 'hard' ones are to a large extent resistant. Preliminary experiments demonstrated that in unwounded plants infection occurs most readily just above soil-level. If the stem is wounded, infection takes place most rapidly at the site of the wound. Secondary infection is found on unwounded stems, but is more usual where they have been wounded by the removal of side shoots and leafing, and where they have been bruised

by the strings. It may also occur at the exposed end of the peduncle after the fruits have been picked.

The fungus can overwinter in the soil, on canes, wires, old strings, and the superstructure of tomato houses.

While only a small proportion of tomato plants propagated or planted out in contaminated soil normally contract stem rot, destruction of the fungus in the soil is necessary, as the disease will make rapid spread through spore dissemination from plants which have become infected directly from the soil. Soil that has been sterilized, however, especially by heat, induces the type of growth most susceptible to attack, and attention should be given to ensure that the cultural conditions are such as to counteract this increased susceptibility.

Applications of petroleum oil emulsions (used as insecticides) and of petroleum oil-copper fungicides greatly increased susceptibility to attack.

Borzini (G.). **Sull' orientamento attuale nella lotta contro le malattie crittogamiche delle piante.** [On present tendencies in the control of fungal diseases of plants.] —*Ital. agric.*, lxxix, 3, pp. 163–166, 1942.

In the course of this discussion of attempts now being made in Italy to evolve satisfactory fungicides containing little or no copper, the author mentions that Petri has succeeded in developing strains of the S. Marzano tomato variety that are absolutely resistant to wilt (*Fusarium* [*bulbigenum* var.] *lycopersici*) [*R.A.M.*, xxi, p. 127]. The disease is stated to cause serious losses in southern Italy [cf. ibid., xiii, p. 562].

Porte (W. S.) & Wellman (F. L.). **Development of interspecific Tomato hybrids of horticultural value and highly resistant to Fusarium wilt.**—*Circ. U.S. Dep. Agric.* 584, 18 pp., 5 figs., 1941.

The available commercial varieties of tomato resistant to wilt (*Fusarium bulbigenum* var. *lycopersici*) [*R.A.M.*, xx, p. 607; xxi, p. 393] have proved susceptible under certain conditions. An attempt has therefore been made to produce high-quality, high-yielding tomato varieties more resistant to wilt than any so far developed in the United States. Among 145 foreign and 209 domestic lots of seed collected in 1932 a single sample (P.I. 79532) of *Lycopersicum pimpinellifolium* from Peru was found to be highly resistant to wilt both in field tests [ibid., xx, p. 91] and in rigorous greenhouse trials [ibid., xix, p. 170]. Through hybridization, back-crossing, and selection [details of which are given], many of the valuable horticultural qualities of the best resistant Marglobe lines have been combined with the high resistance of various lines of *L. pimpinellifolium*, resulting in the production of horticulturally acceptable, highly wilt-resistant tomatoes. Three of such selections, U.S. 7 W, U.S. 16 W, and U.S. 23 W (all back-cross selections from *Marglobe*×*L. pimpinellifolium*) showed in greenhouse tests a wilt-resistance index of 93·3, 94·6, and 94·7, respectively, compared with 7·8 for the Marglobe parent, 97·5 for *L. pimpinellifolium*, and 1·8 for the Bonny Best control. Under the severe conditions of the test the commercial wilt-resistant varieties were scarcely distinguishable from the very susceptible check. Bulk seed of the above-mentioned selections is not yet available, but small samples have been sent to a number of State Experiment Stations for further selection and development.

Bier (J. E.). **Forest pathology in British Columbia.**—*Pulp Pap.* (*Mag.*) *Can.*, xliii, 7, pp. 528, 530, 1942.

Broadly speaking, the whole field of forest pathology falls into two parts, one comprising the diseases caused by native organisms and the other those due to agencies of external origin [cf. *R.A.M.*, xxi, p. 275], the latter frequently assuming a much more virulent form in their new than in their indigenous habitat. An instance of this type is the white pine blister rust [*Cronartium ribicola*], first detected at Vancouver in 1921 and now threatening its host throughout the entire western range.

The reason for this access of 'aggressiveness' in the new territory is that the resistance acquired by a particular host through generations of exposure to a given parasite in one region is completely lacking in the same plant in another. Other diseases of recent introduction into British Columbia are chestnut blight [*Endothia parasitica*] (the host is of no importance locally) and willow blight [*Physalospora miyabeana* and *Fusicladium saliciperdum*] [ibid., xxi, p. 172], the latter having first been observed in Nova Scotia in 1927, since when it has spread right through the Maritime Provinces and the New England States, killing all susceptible varieties.

The introduction into Canada of exotic trees for plant-breeding purposes is also not without its attendant risks, as shown by the canker [*Septoria musiva*: ibid., xviii, p. 770] affecting Russian and native hybrid poplars (balsam × cotton wood) [*Populus tacamahacca* and *P. balsamifera*] in the Prairie Provinces. The fungus, which is merely a minor leaf-spotting pathogen of native species, attacks the stems of exotic poplars and crosses, causing rapid destruction. All imported material and hybrids therefrom should thus be tested for a sufficient period before release for general distribution.

It is of interest to note that in Eastern Canada the presence of decay, e.g., heart rot of poplar [*Polyporus dryophilus* var. *vulpinus*] in Ontario, is of actual advantage to the timber industry as necessitating intensive surveys of the affected areas, in the course of which much more sound wood has been salvaged for merchantable logs than would be expected from the external appearance of the trees. In this connexion co-operation between foresters and pathologists is urged as a basis for the collection of valuable information on the severity and distribution of tree diseases [cf. ibid., xx, p. 435]. A case in point is afforded by the sporadic occurrence of *F*[*omes*] *annosus* in a recently cut stand of 85-year-old hemlock [*Tsuga* (?) *heterophylla*] and Douglas fir [*Pseudotsuga taxifolia*] near Stave Falls in the Fraser Valley, in which there was no outward indication of disease.

In British Columbia the attention of forest pathologists at the moment is largely focussed on problems relating to natural and artificial regeneration of young Douglas firs. Damping-off [? *Pythium* and *Rhizoctonia* spp.: ibid., xii, p. 405] is not serious in nurseries at present, but it is essential to secure its complete control before embarking on the proposed innovation of sowing stratified seed to secure more even stands than those resulting from the use of dry-stored or unstratified material. The short germination period required by the new method would tend to promote fungal infection under appropriate conditions, but an unfavourable atmosphere for the fungi concerned may be induced by sowing the seed on a ¾ in. layer of peat moss and covering with the same. The only disease of importance in immature stands of *P. taxifolia* on Vancouver Island and in the Fraser Valley is the root rot caused by *Poria weirii*, which affects 19 to 40 per cent. of the dominant and co-dominant trees in a plot, a branch and stem canker [? *Phomopsis lokoyae*] being confined to poor sites, while the widespread decay due to *Armillaria mellea* is not responsible for heavy mortality.

Two diseases of some significance at Green Timbers are a leaf and stem blight of oriental cedar and a stem disease of cascara [*Rhamnus purshiana*] caused by a species of rust with its alternate stage normally on oats and wild grasses [*Puccinia coronata*], though the tree race has been experimentally shown to be innocuous to oats.

Regulations made under the Importation of Plants Regulation Ordinance, Nigeria, 1935 (No. 29 of 1935). No. 38 of 1942.—1 p., 1942.

Under an Order coming into force on 1st May, 1942, to be construed together with the Importation of Plants Regulations, 1936 [*R.A.M.*, xvi, p. 79], and cited as the Swollen Shoot (Prohibition of Import) Regulations, 1942, the importation into Nigeria of cacao plants or seeds from the Gold Coast [ibid., xx, pp. 517, 544] except on behalf of the Agricultural Department is prohibited.

INDEX OF AUTHORS

GENERAL INDEX

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